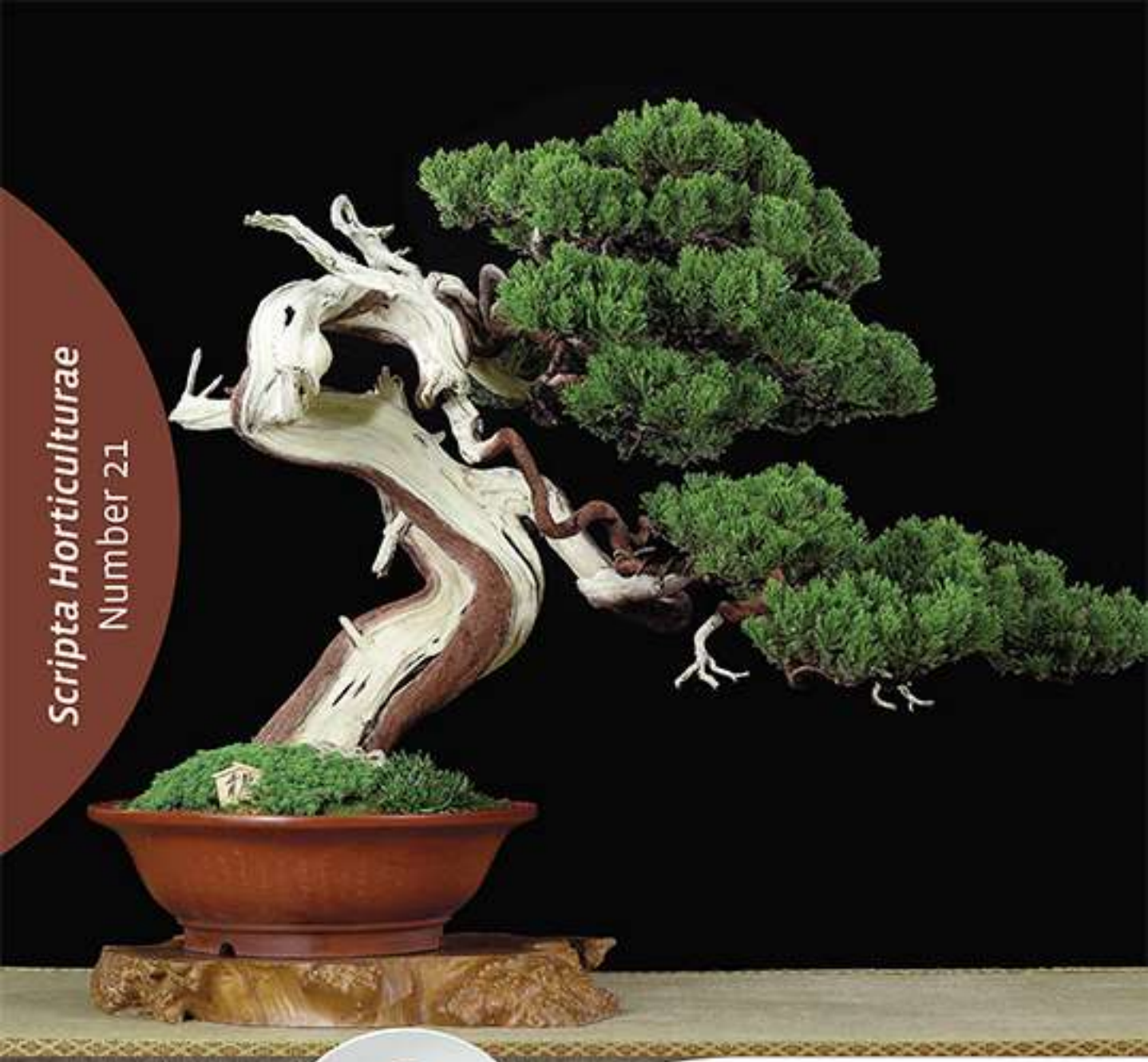

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Number 21

ISHS

First International Symposium on Bonsai

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First International Symposium on Bonsai

Taichung, Taiwan
November 4-7, 2017

Conveners
Hsueh-Shih Lin
Hsin-Fu Yen
Sheng-Shung Huang

ISHS Division Landscape and Urban Horticulture
ISHS Division Ornamental Plants

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Foreword

The First International Symposium on Bonsai was held in Taichung, Taiwan from 4-7 November 2017. The symposium was organized by the Taiwan Society for Horticultural Science (TSHS), the Taichung District Agricultural Research and Extension Station (TDARES), the National Museum of Natural Science (NMNS), the Department of Horticulture and Landscape, National Taiwan University (NTU), and the National Bonsai Association of Taiwan under the auspices of the International Society for Horticultural Science (ISHS) and with the support of the Council of Agriculture (COA), Executive Yuan, ROC. At the same time, the 2017 Bonsai Club International (BCI) Convention and the 14th Asia-Pacific Bonsai and Viewing Stone Convention & Exhibition were conducted in Changhua, Taiwan. More than 100 bonsai-related researchers, technicians, creators, and enthusiasts from 16 countries shared their knowledge and information in this first ever bonsai symposium.

'Bonsai' is one of the most traditional and unique horticultural techniques from the 6th century until today in Asia, as well as worldwide. It connects with cultivation and art. Its marketable demand and value are increasing gradually with the raising income, as along with life aesthetics of consumers. In the past few years, Taiwan has played an important role in the development of the bonsai industry. Therefore, the organizers invited both distinguished researchers and industrial experts to deliver their research results and experience.

Two keynotes, six delegates from USA, Singapore, Japan, Israel, India, and Taiwan, shared the characteristics, development and future prospects of bonsai in their countries. The scientific topics of the symposium were grouped into four sessions: History, genera, and aesthetics; Technologies; Genetic diversity; and Application and development. Another special arrangement by the organizers was a bonsai master demonstration, showing a full spectrum of techniques such as cutting, pruning, and shaping.

The symposium covered studies on many aspects and aimed to provide a platform to report on all information and to offer an opportunity to share knowledge for a better understanding of bonsai. We are also grateful to all committees, speakers, and participants for their contributions to the success of the symposium and thank the financial support from COA's project.

Conveners of the 2017 I International Symposium on Bonsai

Dr. Hsueh-Shih Lin
Taichung District Agriculture and Extension Station
Taiwan Society for Horticultural Science

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LIST OF AUTHORS

The impact of climate on bonsai care in eastern Europe

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Abstract

Knowledge of the Polish bonsai came from the interpretation of Japanese books or bonsai leaders. There was no way or possibility of a direct way for teaching. Bonsai production should consider environmental factors such as temperature and seasonal changes, based on my experience for more than 20 years. Cultural techniques, particularly water management and hormone application, are a key topic to produce bonsai. A better understanding of watering, fertilizing, and pruning techniques facilitates the regulation of tree growth and the corresponding structure. Knowledge of the tree physiology has improved the vitality of plants acquired from nature. Applying the phenology, natural growth of the plant, to bonsai production results in faster growth and well-shaped structure. The seasonal conditions caused much longer working time in Poland, resulting in a few more years for bonsai completion but with similar quality as compared with those in Japan. After working and learning the required technique in the Yamadori, we produce the tree bonsais such as the *Pinus mugo* (mountain pine) that are very popular and desirable in Europe. The production ways effective in Japan or Asia may not suit the conditions in Europe. Production of bonsai should focus on the plants' growth and their climatic requirements. Bonsai production is a long process, during which we can enjoy and communicate with nature.

INTRODUCTION

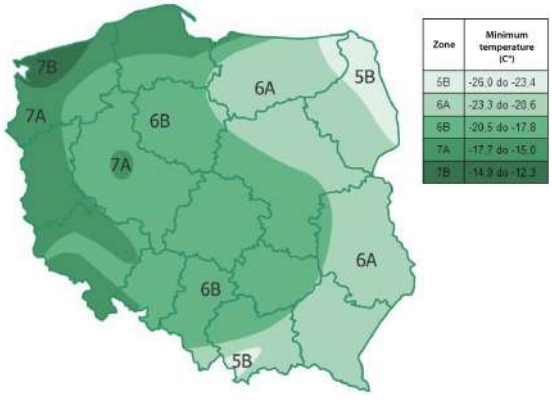
Poland is a far country in the west, although in Europe it is called a country of eastern Europe. The country is bordered by the sea in the north, by the mountains in the south. It is composed of lowland for 90%. The subject of bonsai is known in our country for many years, by many people, many techniques, many methods: one effective, the other less. During the last 20 years we have come to the present state of knowledge about bonsai care. My presentation will introduce you to the history and meanders of bonsai art in this part of Europe. The first serious bonsai articles appeared in the late eighties. The first book about bonsai was published in 1990. However, the real news came after 1993 when the Magazine "BONSAI ART" began to appear in Germany.

Figure 1. First book of bonsai in Poland (left) and German Magazine BONSAI ART (right).

Most information in this magazine was simply a Japanese translation of Kindai Shuppan. People who had access to this information, including me, could only learn by reading these articles. Today, people who have remained since then in bonsai world are leaders and bonsai teachers. All this knowledge has been continued for twenty years, but is it sure to work with such different climatic conditions?

People in Europe have long forgotten about the structure of the tree. They kept only the shape, because they think the structure is not reachable, then why should I focus on it? As I mentioned, the differences in climate are essential and the plants are developing differently. It took me many years to understand this. Summer in Japan is very hot and wet, winter moderate and dry. In central and eastern Europe, summer is dry and winter wet and often very frosty. Winter temperatures also have a major influence on the condition of trees after resting time.

In Poland, there are frost-resistance zones of plants, which is the lowest average winter temperature in a given zone.



Zone	Minimum temperature (C°)
5B	-26.0 do -23.4
6A	-23.3 do -20.6
6B	-20.5 do -17.8
7A	-17.7 do -15.0
7B	-14.9 do -12.3

Figure 2. Map of frost-resistance zones in Poland (by Wikipedia).

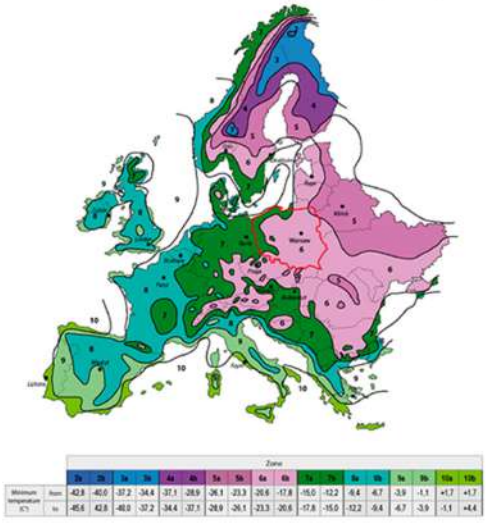


Figure 3. Map of frost-resistance zones in Europe (by United States Department of Agriculture).

RÉSUMÉ: THE MAIN DIFFERENCES

- different summer and winter period;
- medium and extreme temperatures;
- amount of rain;
- vegetation period.

Winters are very unstable. There are winters with lots of snow or high temperatures. The way of wintering plants in Poland is influenced not only by low temperature but also by the sunshine, the amount of snow and the drying wind. We can plant *Acer palmatum* in zone 6A and it can grow up to a few years, but it can suddenly become so cold in winter that the whole plant will be frozen under the snow. Same with wintering bonsai, *Acer palmatum* is a very good example. Even a plant produced in Poland is not always able to cope with every winter. This year at the end of January in my part of the country temperature for two weeks stayed -25°C at night.

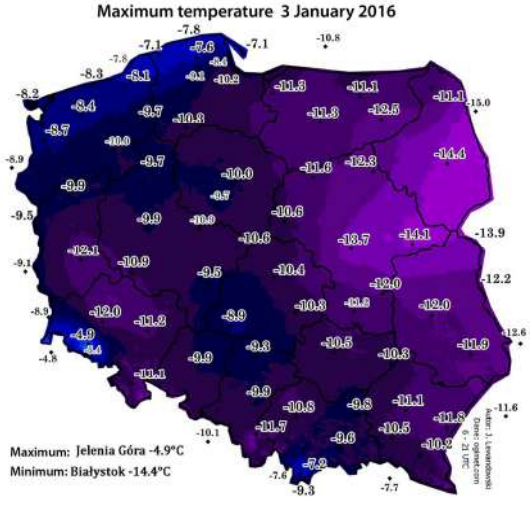


Figure 4. Maximum temperature of January.

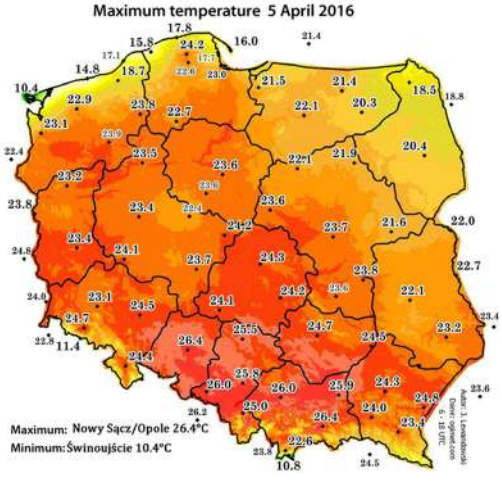


Figure 5. Maximum temperature of April.

However, this winter hibernation of plants is not as hard as spring time and its temperature jumps. In this part of Europe we have very often high temperatures in April.

We have also very often high temperature spells between night and day, and the frost on the ground can last up to 15 May.

Figure 6. Minimum temperature at the ground.

Figure 7. Frost on *Carpinus* on 14 May 2017.

During this period it is very common to lose many flowers and leaves on the plants. Just like *Carpinus betulus* and *Carpinus turczinovii* cope with such low temperatures, so *Acer palmatum* and *buergerianum* are not able to withstand such low temperatures with leaves. Summer period has high temperatures and very little rainfall. On hot days, it is often necessary to water plants twice.

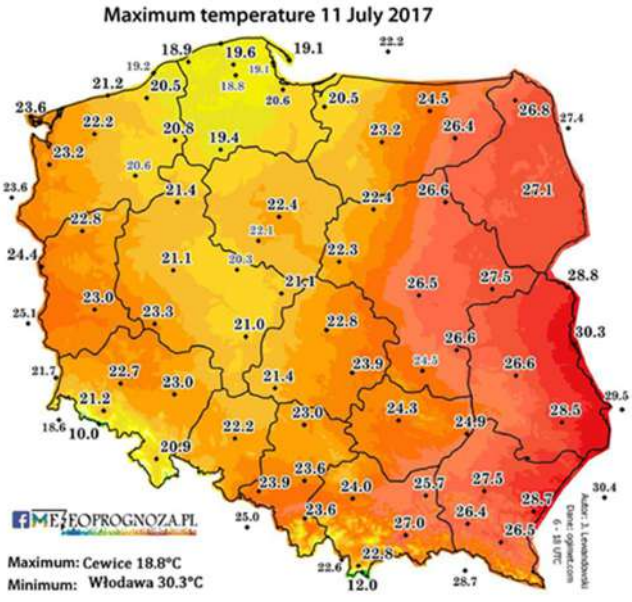


Figure 8. Maximum temperature of July.

SETTING BONSAI WORKS DURING THE SEASON

All these factors affect the length of vegetation time in Poland, where average vegetation time is about 200 days.

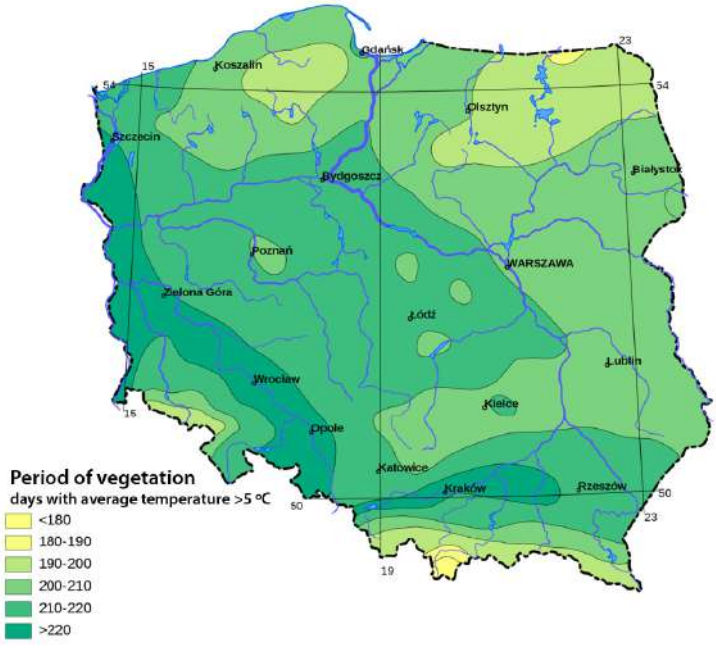


Figure 9. Map of period of vegetation in Poland (by Wikipedia).

In the example of the growth rate of *Pinus sylvestris* and *Sorbus aucuparia* we can see the development of plants in this climate zone.

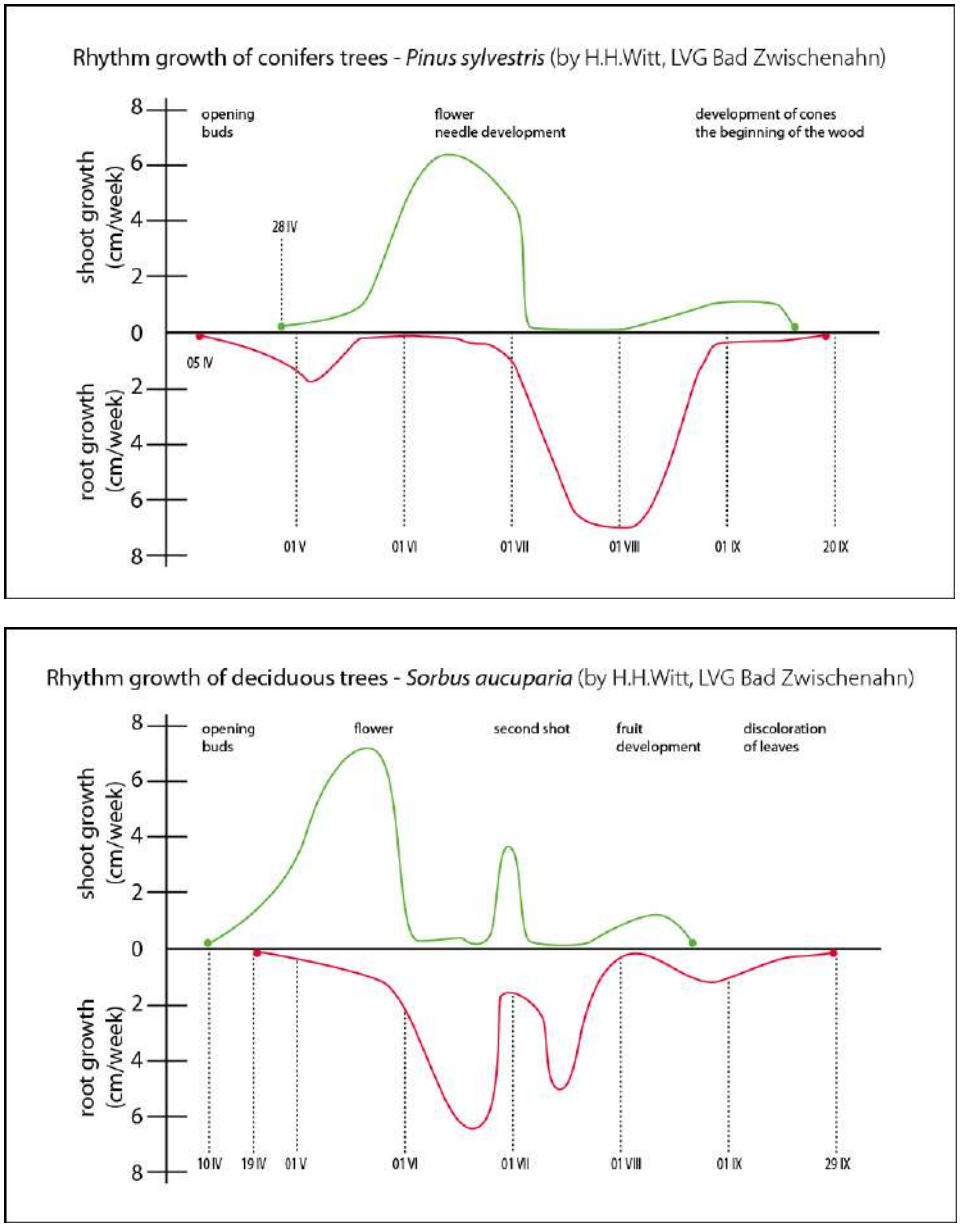


Figure 10. Rhythm growth of tree.

In the drawings you can see the length of development of all parts of plants, both aboveground and roots. These graphs enabled me to set bonsai works during the season:

- Spring replanting is April, the moment of bud opening. This is also an indicator of the condition of the tree after winter (how many buds survived the rest period);
- Summer care: the first cut for buds and defoliation is June, full shoot. It is important to do so until around 10 July at the latest, so that the developing lines after the cut have

reached the end of the growing season and have a chance to hold the winter;

- The period of summer, the turn of July and August, is a very good time to replant conifers. The heat and the ability to quickly dry the plant after pouring gives it the ability to quickly root. This is also the time of the greatest growth of roots for many species of conifers. This period is also the production period of buds for next year. The buds that will be created now up the next year are the key here for both coniferous and deciduous trees.
  (Range of summer work: cleaning needles or cutting long lines on deciduous trees)
- Summer temperature in Poland is within 30°C and the fact that it is very dry also affects the way of fertilization. Here only liquid fertilizers work, solid fertilizers dry too quickly in this period and are unable to release the needed amount of minerals.
- Autumn working: October, with full autumn discoloration of leaves and withdrawal of sugars to the trunk, is the period of preparation of trees for the winter. Excellent time to work both on the structure of deciduous trees and subsequent shortening to buds and coniferous trees.

The rest period of almost six months gives a fairly long buffer time of the wire on the branches.

The rapid growth of summer plants causes quite fast markers on the branches.

In my climate it is very important to fine-tune the work of the bonsai to the seasons, it allows linear quality of the plant despite such a short season.

If it goes beyond the calendar of work, it is difficult to get a good tree structure. Many people are looking for half measures, focusing only on the shape of the bonsai.

DEVELOPMENT OF BONSAI IN YEARS – EXAMPLES TO SEASONAL WORK

Now I would like to present examples on the way of developing bonsai in years according to seasonal works:

Figure 11. *Carpinus betulus* (2003), exchange of thick roots at every transplant (2005).

Thirteen years have taken me to exchange the apex, all the roots, and improve the structure of the branches.

Figure 12. *Carpinus betulus* (2008, 2017).

Another example is the *Pinus mugo* of my friend Juraj Marcinko from Switzerland, who also works according to seasonal work. This is a spectacular example:

Figure 13. Tree after the first formation (J. Naka, 1985).

Figure 14. Tree of 1995 and 10 years later (2005).

Figure 15. Tree of 2017.

Pinus mugo mountain pine is the most popular coniferous material in Europe and most wanted, but its characteristic growth (very long lines) exposes many bonsai people to the test of patience in working on this material, so in Europe there are so few mugo in good shape.

Figure 16. Two-year-old *Pinus mugo* material.

Another example from my collection may also be the *Pinus mugo*. This is a much younger but no less beautiful tree.

Figure 17. *Pinus mugo* (2009, 2010).

Figure 18. Working on *Pinus mugo* (2010).

Figure 19. *Pinus mugo* (2017).

GETTING QUALITY BONSAI-MATERIAL

In Poland *Pinus mugo* occurs only in the mountains, in national parks. Getting from there some material is impossible with a risk of fines up to 5000zł (1200 Euro).

In Europe, the incidence of *Pinus mugo* is huge and goes far beyond landscape and national parks.

Other trees, such as deciduous trees, especially those that do not yield productivity to the forest, can be found in the forests. Trees that are often damaged by animals, such material useful for us and cut by the forest services to the place for new trees, can be legally obtained after prior notification to the forest service.

Figure 20. *Yamadori* – Trip March 2014.

Figure 21. *Yamadori* – Trip May 2016 (*Fagus sylvatica*).

Today many young people are looking for learning bonsai and they go to Japan. They finish shorter or longer courses, it is good if they get to know the whole season of work, not only working on their skills end up wiring.

If these young people are not properly oriented to thinking, watching the season and the reaction of plants to the activities, their knowledge will grow very slowly and of course the quality of their plants as well. All we know what we are learning, we must apply here and now according to the natural development of each plant.

Figure 22. *Fagus* (2016) – before cutting and after cutting.

The misinformation that plagues the U.S. bonsai community

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Abstract

The Japanese version of bonsai has most heavily influenced the United States version of the art, what one most commonly sees there. The first bonsai creators and teachers in the U.S. had little training in bonsai, and essentially re-invented bonsai using what they had at hand. For several decades the choices this group made heavily influenced what others did in U.S. bonsai. These choices were often at great variance from what was done in Japan.

Significantly, there has been a rather large body of misinformation that came out of these early years in the United States, from both the bonsai and horticulture fields. Some of this misinformation is technical, and some of it is aesthetic. The technical includes such erroneous beliefs as junipers need to be constantly pinched throughout the growing season (which can kill them), to the fantasy that sharp sand makes roots fork (which is untrue as such soils have lower root ramification). Also the bonsai myth that water on the leaves in the sun burns them comes from the gardening and forestry world (only relatively recently disproved by a Hungarian research team).

Misinformation is tenacious and takes a long time to dispel. For any art form that rests so heavily on technique as bonsai does, understanding the tradition makes sense as it tends to have a long history of things that work, and misinformation tends to end in damaged trees. The U.S. bonsai community is currently trying to address this issue.

WESTERN BONSAI MYTHS

Introduction

Since much of the following is from personal experience, this paper occasionally uses the personal pronoun 'I', which of course is not usual for scientific papers. Over the last few years it became apparent how many inconsistencies existed between what I learned about bonsai as a hobbyist in the United States, and then as a bonsai apprentice in Japan. The variance was unmistakable, and also deeply contradictory. It also occurred to me that these issues might exist elsewhere, and so perhaps some of these are familiar to other practitioners.

Although there are many aesthetic inconsistencies and myths in bonsai, I've focused this paper on those technical considerations that might interest a scientific community. Throughout I use variously science, tradition, and common sense to discount these myths of bonsai practice. The strikethroughs in the section titles is intentional, to remind readers that this is incorrect information.

Short history of U.S. bonsai

The most common form of aesthetic small trees in pots in the United States is derived from the art of bonsai from Japan. There are practitioners of Chinese penjing, and even a few public collections that have them, but I will narrow my comments to the more common form of the art in the United States, the Japanese form of bonsai.

The first creators and teachers of bonsai in the U.S. were professional nurserymen and yet amateur bonsaiists, and they had no training in bonsai. Because of this lack of background,

they used the skills they had, and translated those horticultural assumptions to bonsai. This resulted in a rather pretty mess of problems, since the horticultural backdrop of the time brought with it falsities, some of which remain today.

Some of these falsities resulted in hard-earned and hard to get rid of misinformation. Books were written vaunting them, and then other books parroted those same beliefs. The purpose of this paper is to bring some of these erroneous ideas from the bonsai world and the horticultural world to light.

One of the challenges for the U.S. bonsai community is to admit that our natural American inclination to be bold, different, and individual is not easily in keeping with practicing a traditional art. Part of this may explain our stubborn adherence to ideas which don't come from Asia.

20 BONSAI MYTHS

Water drops burn leaves in the sun

'Get water on leaves under a hot summer sun and you'll get burn marks!'

Many of us have received this dire warning without the evidence to back it up. And so we don't dare spray water on our bonsai in the sun. Oddly enough, burning never seems to occur. Finally, we have some research that straightens this issue out.

'It is a widely held belief in horticulture that plants should not be watered in the midday sun. One of the reasons given is the risk of leaf burn resulting from the focusing properties of small water drops that form on the surface of leaves. Scientists in Hungary and Germany have now performed a series of optical experiments with *Acer* and *Ginkgo* leaves to test this assumption. Gábor Horváth and co-workers conclude that although it is indeed possible for sunlight glass spheres (diameters of 2-10 mm) to cause serious leaf burn, the situation is highly unlikely to occur for water drops on smooth, hairless plant leaves. The researchers explain that the main reason for the lack of damage is that—unlike a glass sphere—a water drop usually only forms a weak lens, owing to its typical ellipsoidal shape and the refractive index of water, and so usually has a focal region that falls far below the surface of the leaf. However, for leaves with hydrophobic wax hairs, such as floating ferns, spheroid-shaped water drops can form suspended above the leaf surface, resulting in a higher risk of burning. The researchers say their analysis suggests that claims made about sunburn due to the formation of water drops on human skin should therefore be treated with a healthy dose of skepticism.'

"This is far from a trivial question," said biophysicist Gabor Horvath at Eotvos University in Budapest, Hungary. "The prevailing opinion is that forest fires can be sparked by intense sunlight focused by water drops on dried-out vegetation."

According to his research, a few plants, such as some floating ferns, with a hairy surface may loft the water droplet high enough to create a lens, damaging the leaf below. Most leaves, such as those that have smooth surfaces like maple or *Ginkgo*, are unlikely to have damage.

Sugar is stored in the roots

Not sure when trees began storing sugar in their roots…that is, they DO store it there, but they also store it everywhere else there is wood, particularly in the ray cells. A carrot stores its sugar in the roots.

If this idea were true, one might be over-cautious in cutting off roots of bonsai when repotting them, so it is far from simply a semantic point. But if the sugar is coming from other parts of the plant, namely the wood, then removing an appropriate amount roots can be done without concern for lack of energy to regrow.

Sharp sand makes roots fork

In days past, 40 years ago, the idea in the United States that 'sharp sand' should be included in the soil mix to make roots 'fork', and therefore ramify, was the highest wisdom in the land of bonsai.

This one must have required a bit of imagination to dream up. It would go like this: 'If a growing root tip hits the edge of a sharp piece of sand right on the edge it will have to fork.' This is quite a fanciful idea, what in scientific circles is aptly called a 'just so story'. It sounds logical, so it must be true.

Yet truth is that tree roots grow quite poorly in sand, sharp or not. They don't ramify much at all, and tend to be long and stringy, resulting in loose root balls that have trouble holding the soil mass together.

Since ramification in bonsai is a top priority, and since the roots mirror the shoots and vice versa, the importance of soil and how it promotes root growth, and in particular, fine root growth, is an area of particular concern.

Copper wire left on branches over winter will kill them

Copper wire, or any wire, certainly does get cold in the winter. The wire is more conductive, so when you touch it, heat is drawn away from your finger rapidly, and so it feels much colder than the branch that it is on. This has created the myth that if you leave wire on your tree in the wintertime, the branch will get colder and will die. Much more likely is that a tree wired in the fall or winter and bent created a crack, and that desiccated the branch over the winter causing it to die. The 'cold' wire was blamed for poor bending technique.

A study done at Cornell University years ago showed that wire left on in cold weather did the opposite of chilling the branch, it functioned as an insulator to the bark.

In truth, wire may be kept on the tree with no detrimental effects whatsoever. When I was an apprentice in Japan one could see wire that had been left on bonsai for five years or more—on old, slowly growing conifers, which went through a cold winter—and these trees did not lose branches as a result.

Never let wire bite in

Another wire myth is that if you don't take the wire off your tree before it bites into the cambium, irreversible damage will occur.

In truth, for deciduous trees, it is possible to cut or unwind the wires before they bite in, and the branch may still hold. On conifers, which are more flexible, there is no way that the branch will hold it's place if the wire is taken off too soon. The wire on a conifer branch must bite in a little bit, or it won't hold. Taking those wires off too soon is just wasting work, and wire.

You must constantly pinch junipers

Probably four mistakes have killed more bonsai than all others combined: improper watering, improper repotting, poor winter care, and pinching of junipers. Let's take a look at how junipers grow, and see if that then can shed light on why we should not pinch them.

Junipers are opportunistic growers, they don't need to push a candle or to open a bud to grow, and many lack true dormancy requirements. Give them fertilizer, water, light and warmth, and they will grow.

So we have a tree that is going to grow with the right conditions. The tip on the juniper grows, and as it grows the interior growth quite naturally will turn yellow and fall off. This is the normal life cycle of the shoot on a juniper. We cannot prevent it from happening.

We have yellowing foliage on the interior, with a green exterior and a growing tip. The thinking of this myth is: 'If we just pinch the growing tip, interior growth will be forced to grow.' We can force it to create buds. But it does not work that way for a juniper.

Junipers don't like forcing. We need to keep the majority of the growing tips on a juniper. If we constantly pinch every living tip, the tree will panic, not grow roots, and weaken.

This is not to say we should do nothing with our junipers. We can manage growing shoots, but we must do that in a particular way. The tips that we can manage are those that are growing outside the pad/cloud of foliage. These are the strongly growing shoots that will turn into a branch if left alone. Cut these few strong shoots out with scissors, and leave all the others alone. Eventually the energy will moderate between all the shoots and we have greater density in our shoot growth.

This is a better guideline for junipers: we can cut branches back, and cut shoots that extend past the outline of the tree, but leave everything else that remains alone.

Our junipers will, eventually, outgrow their forms. That is something we accept about bonsai, even junipers, that eventually we need to rework the tree. We'll need to cut back to new branches for better taper and to make the profile smaller. We'll need to rewire the tree, bring branches down again. All these things are acceptable because there is no other way to maintain a juniper at roughly the same size over time, to remain in harmony with the trunk, which will not change much. The issue with this myth is that it tries to maintain a juniper using a technique that might work for a Japanese maple or Ezo spruce.

Always water bonsai in the morning or the evening

This might be reasonable advice in gardening, where one is just trying to hydrate plants before the sun gets high, and not waste water that in the heat would be 'lossy' due to evaporation, and yet things are a bit different for a bonsai. Very simply, we need to water bonsai when they need it.

The bonsai is in a limited pot size, which limits the amount of water it has in reserve. If we water too soon, we've just watered a tree that has not dried out. If we water too late, we risk burned leaves.

So why not water on a schedule? On the surface this seems like a brilliant plan. It's easy. We can plan around it. We could schedule a timer to water for us. But even that runs into trouble with trees that have different needs. They begin to go downhill, either not being watered enough, or being watered far too much. On hot days we often have only a 2-3 hour window to accurately water a bonsai, which might have different needs than the bonsai sitting next to it.

We need to water when the bonsai needs water. Not before. Not after. And definitely not just in the morning or the evening.

A bonsai needs a first branch, second branch, then back branch

This is a reasonable suggestion for styling a young tree, to set up a kind of 'organized asymmetry.' The utility behind this rule of thumb is solid, to give a sense of asymmetry to those of us unfamiliar with it. And yet, rules are useful for young trees, and less and less useful the older the tree is.

These days we find more and more trees starting their lives as bonsai very old, such as some excellent yamadori (collected from the wild), we should remember that these guidelines should be applied only to relatively young stock. When applied to an old collected pine, juniper, spruce, or hemlock, these rules become difficult to use. We can get into the territory of cutting off branches because they are not in the right place, when we really have very few branches to begin with.

Always remove opposite branches

Asymmetry is not lightly cast aside. Our bonsai look funny if we do. Naturalness is most easily upheld if one imbalance is lightly balanced by the next imbalance—this is the path to creating balance in asymmetry, and is the rulebook that all these rules of bonsai support.

Still, there are situations where the opposite branch must be left intact. These are harder to explain than to feel when presented with them. But occasionally one encounters a tree with about four branches on it, and it's an old one, and if you cut off one of the four you've barely got a tree left. The tree has enough enticing character to it that you'd not just willingly give up the idea of bonsai entirely, but rather seek to work with what you have. And that is where leaving a bar branch might be the right thing to do.

There are a few other considerations that crop up. As branches grow, they thicken, and with time those that were alternating on a trunk may become nearly opposite. But on an old tree if we cut them off we may have destroyed the balance. Or created a big scar. Then we have sacrificed beauty or balance for a limited rule. The older a tree, the less we can be guided by rules. Balance overwhelms rules.

Another very important distinction is that many rules, like this one, have been taught relative to an assumed size, namely, moderate to large bonsai. Shohin and chuhin are another matter. Very often with these very small trees, many of the upper branches are literally opposite branches.

Real bonsai artists make a drawing first

We have an unfortunate situation in the United States that movies and its stars have great sway over what we think and do. The hit film 'The Karate Kid' from 1984 had the bonsai master doing a drawing first, before working on his tree. For years thereafter, in bonsai demonstrations and workshops, drawing the tree first became a fad. I don't remember any Japanese bonsai master starting with a drawing before working on the tree, this was an American anomaly.

The idea does have some merit, as a way to show an audience from a stage what the demonstrator was seeing as a possibility. There is some utility trying out graphic programs to see where branches should go, to work one's way to balance. For those newer to bonsai, who are unsure and want to see possibilities, this is not a bad idea.

But a drawing is by no means necessary to create a great bonsai. And there are a few reasons where it might get in the way, especially once the practitioner has some experience under the belt. The most important of these is that when a drawing is made, the bonsai artist is very eager to force the tree into that form, even if as it is being worked on other opportunities and suggestions arise. And, sometimes, it is not possible to actually create what the drawing insists must be.

Also, the creative act with a tree is not a paint by numbers activity. A large and fulfilling aspect of creating a bonsai is to be in collaboration with the tree as it is being formed into a bonsai. This is hamstrung when there is a 'form' dictated by an image which must be actualized. Creativity is freedom from such bounds.

Additionally, with experience, the knowledge of where the artist wishes to go with a tree aesthetically, combined with knowledge of technique, presupposes that a drawing is not needed.

Because they inhabit this idea so well, I never saw a bonsai master in Japan do a drawing before working on a tree. Actually, I believe that the fact the masters in Japan do not do drawings is a clue to the approach they prefer: reading the tree as it is being worked on.

Copper/aluminum wire is best

They are both good. Anyone who claims one kind of wire is better than the other maybe doesn't understand the properties or uses of the two types very well. This is curiously an argument that goes back and forth in Europe as well as the U.S.

Copper wire has properties that are very useful on flexible conifer trees, which may have the wire on them for years, and are often exhibited with the wire on. This is generally agreed on in Japan and throughout Asia, but is subject to debate in the U.S. The wire is smaller

in diameter at the same strength, and also develops patina over time that makes it camouflaged, and for those reasons alone using copper on species that need wire left on for long periods makes sense.

Aluminum wire has properties that are best used for short-term wiring, such as for delicate-barked deciduous trees, which are often unwired in a month or two, and are never exhibited with wire on them. It is softer than copper and won't damage delicate bark as easily. This wire is thicker for the same strength and is also shiny and anodized, which is more glaring and obvious than copper wire.

One of the least talked about issues in this debate, but probably the most key in it, is the difficulty of learning how to use copper wire effectively without damaging the branch it is wrapped on. But this is more an example of the disinterest in acquiring the necessary skills as it is a strong argument not to use copper.

Soil should be dry when repotting

Letting the soil dry out definitely makes the soil fall away easier when gently removing soil. Sure, this is easier on us when repotting. However it might also be desiccating a tree right when it needs internal moisture most.

Consider: if there is a tree with dry soil, it needs watering. It's on the doorstep of dehydration. Then we come along, take this dry tree out of the pot, cut off many of the roots including many of those fine feeder roots that do most of the water uptake, and put it back into the pot. What we have now is a tree that is water stressed with little ability to re-hydrate. The soil prior to repotting should be just lightly damp. Easier on us than soggy soil, but enough to keep the tree happily hydrated.

A slower drying soil is best

The opposite is true. In the ideal world, where none of us work and have to water in the middle of the day, the best soil is the one that has rapid turnover from wet to dry. That one will cause the fewest root issues. It will have lots of gas exchange, because roots respire.

It may be tempting to have a very slow drying soil for bonsai, and for some lifestyles we may have no choice but to use those soils. However, that is not ideal. The plants will not develop as rapidly in them because root growth will be slowed down.

Stop fertilizing in the summer

This question rests on how damaging the hot summers are where the bonsai are. In some cases, the heat might be so high that fertilizers may cause root burning issues, and their removal may be wise. For many temperate climates, fertilizing may be continued through the summer because the summers are mild. In most of these climates the growing season is also short, and so it is best to fertilize all the way through it.

This is a good example of a 'rule' found in bonsai books in English without taking into account the geography of the practitioner.

Benches should face east-west

Somewhere this became an idea, that benches should be positioned east to west. The idea does not take into account that there is better overall light distribution on benches when they are positioned in the north-south orientation.

Like grape vines, bonsai benches get more even light when placed north-south. This is especially true when our benches are two bonsai deep, in other words, when the benches are wide enough to have multiple trees on them.

B-1 stimulates root growth

Over a century ago there were some reports that vitamin B-1 supported the growth of

roots. Here is a recent report from Washington State University:

'Many decades ago the plant growth regulators called auxins were isolated and characterized. Auxins were found to stimulate cell elongation in both root and shoot tissues. Commercial preparations were developed that contained auxin and vitamin B-1 among other ingredients. Research in 1949 found improved root development in plants treated with one of these preparations (Transplantone, which contains both auxin and thiamine), but noted the importance of auxins in this response. Further research throughout the last half of the 20th century investigating the application of auxins to root systems suggested that auxins may stimulate root growth, but that vitamin B-1 on its own does not.'

"Vitamin B-1 reduces transplant shock by stimulating new root growth."
Linda Chalker-Scott, Ph.D., Extension Horticulturist and Associate Professor, Puyallup Research and Extension Center, Washington State University.

Pigeon breasts are shameful

This is a bonsai guideline that has a lot of traction in the tradition. It is not altogether wrong, it is a good suggestion…to a point.

A pigeon breast—part of the trunk that moves strongly toward the viewer—is meant to prevent too aggressive a feeling in a bonsai. Bonsai are often intended to be welcoming, which means the trunk moves gently backwards at first. That is not a bad idea. But it can be limiting.

The problem with many guidelines in a traditional art is that they can be followed too strictly. Then we get into the dark waters where a better front, or inclination, or presentation has been avoided simply to follow a dictum. This is where art erodes from the craft and tradition, and we get poor creativity.

There are very famous bonsai in the world that do have pigeon breasts some place up the trunk. And they are famous because they have other excellent qualities that would have been minimized had the creator not sidestepped this one guideline. Balance overwhelms rules.

Reverse tapers are naughty

This one reads the same way as the last. It is a good guideline…to a point. There are situations where reverse tapers are ok. The most obvious example are junipers, which may possess reverse tapers several times up the trunk, because they have 'wings' or other flattened trunk qualities in the deadwood areas. Do we throw those trees out? No. Some of them have won top awards throughout the world, for very good reasons. And those reasons are not derailed by the fact of a reverse taper somewhere on the trunk.

Again, this is an exception to the rule, and for most bonsai the rule is a good one. We just need to know when to ignore it, which would be on collected stock where deadwood is a primary feature.

Creativity in bonsai is doing something really wild

When we talk of creativity, we often think of the art world, where being dramatically different is setting oneself apart. This does no favors necessarily in bonsai, where being subtly different is regarded with higher praise. It is a traditional art and as such it has some boundaries beyond which we are no longer doing bonsai. But in the West, where traditional arts are not fully embraced, this idea tends to have traction, that 'being wild is precisely what bonsai needs'.

But creativity within a traditional art is assimilating the tradition fully, then making small adjustments in the expression of it. This is very challenging, requiring a deft hand and a quiet demeanor. This is difficult for many people, it may be easier to be reckless and bold. But it doesn't make bonsai created in that fashion better. It is just the sort of thing one might hear

in a country like the USA and think it is a rule of bonsai.

The more trunk movement, the better

This is another example of the overstatement that can occur in manuals of bonsai in the Western literature, that then creates losses in understanding for newcomers.

Forest bonsai often have very little trunk movement. And formal upright bonsai have almost none. Both of these examples are not improved with trunk movement, they are diminished by them. But even with the informal upright style, 'more' trunk movement does not necessarily correlate to better trunk movement.

Some of the best bonsai in the world have very little trunk movement. The shows around the world demonstrate that the winners often are very quiet trees that do not dance all over the place. This must be understood to be fully awake to the potentials and meaning of bonsai.

CONCLUSION

These are just a few examples of the misinformation that I've come across, which have little connection to the accepted tradition of bonsai.

Of the errors in Western bonsai approach, the most egregious of them is reprinting technical things about bonsai that are incorrect in book after book. Hopefully this is the beginning of a new era in understanding what is and what is not useful in the practice of bonsai, using science, common sense, and tradition as our guides.

Israeli bonsai – from concept to reality: an updated review of a growing enthusiasm

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Abstract

The bonsai scene in Israel is constantly evolving and growing year by year, thanks to great investment and enthusiasm, both individually and through organizations, such as bonsai clubs and the Jerusalem Botanical Gardens. The study and transfer of theoretical and practical knowledge is led by local bonsai artists operating in local bonsai clubs, as well as by international bonsai artists that conduct demonstrations and workshops as well as teaching the bonsai theory according to their own perception. The impressive growth in the use of bonsai trees well cultivated, has led to rising demand for bonsai trees as a desirable consumer product. This report will address three main characteristics of the bonsai scene in Israel: review the background to the development of the Israeli bonsai, along with its evolution at different periods of its path to the present day. The report will discuss the current state of bonsai in Israel, including an overview and analysis of style or sometimes lack of style in the Israeli bonsai scene. I will provide a future outlook to the development of the bonsai industry in Israel in several aspects. Like a young state that shapes its image and is influenced by external forces such as: economies, trends, fashions and the necessity of reality, so does the Israeli bonsai, which is influenced by old trends and new concepts, free, naturalistic, or innovative in every sense.

Keywords: Israeli bonsai, Israeli bonsai scene, Moshe Emergui, bonsai Moshe Emergui, bonsai art, bonsai Taiwan, bci Moshe Emergui, ISHS Moshe Emergui, Taiwan bonsai symposia, *Acta Horticulturae*, bci 2017, bonsai Taiwan 2017, International Bonsai Symposium, country report, Moshe Emergui article, 2017 International Symposium on Bonsai

INTRODUCTION

To understand the Israeli bonsai I must first introduce you to the state of Israel.

Israel is one of the smallest countries in the world. It declared its independence in 1948 and nowadays is only 69 years old. It is the only democracy in the Middle East. Geographically Israel lies on the shores of the Mediterranean Sea. The population in Israel is approximately 8.5 million people, constituting less than 0.1% of the world's population. Israel is located between 29-33° north of the equator, which is characterized as a subtropical region, between the temperate zone and the tropical zone. Israel's climate is characterized by a long hot and dry summer and a cold short and rainy winter. Autumn and spring are short and do not manifest themselves clearly felt. Heavy snow falls only in the northernmost part of the country. The climate of the northern and coastal regions of Israel is hot and humid in the summer and cool and rainy in the winter, whereas the southern and eastern areas of Israel are dry and arid most of the year. The rainy season extends from October to early May, with rainfall peaks in December through February. Israel is the only country in the world to enter the 20th century with an increase in the number of trees in its territory, which is worth mentioning because about 60% of its territory is a desert. Israel is an amazing country, a technological superpower with impressive inventive achievements in the fields of agriculture,

medicine, solar energy, computerized printing, military technology, Apps like WAZE and a lot more. Israel has developed amazing hydrology methods that allow crops to grow in the most arid regions, sharing this information with many countries. In Israel the number of startup companies in relation to the population is the highest in the world. Many Israeli companies are traded on NASDAQ, more than China, India and Japan all together. Since the establishment of this state it has won more Nobel Prizes per capita than any other country in the world.

The Israeli bonsai enthusiasts are a small community that is growing each year with a great thirst for relevant information on how to grow, design and maintain bonsai. They inspire to succeed in a competitive world. They have a lot of excitement for the art that connects so many people in the world. Some enthusiasts see bonsai as a hobby, some enjoy having a collection of beautiful bonsai trees in their garden but do not want to stand out and some see bonsai as a professional pursuit and a way of life. Bonsai trees are exhibited throughout the year in bonsai nurseries, annual bonsai displays, private collections and in the Jerusalem Botanical Garden (JBG). The JBG is Israel's largest public garden. In addition to its focus on connecting the public with nature as a recreational destination, the garden is also a local and international pioneer in promoting environmental and horticultural education, as well as urban sustainability and eco-social activism. Finally, the JBG is also one of Israel's premier institutes for academic botanical research. The JBG seeks to build the environment that will foster future generations of Israeli bonsai artists.

The first interest in bonsai in Israel began in the early 60s and 70s with Haim Shir, when he saw for the first time in his life a bonsai tree in an American gardening magazine.

From that day on, he was captivated within the magical world of bonsai. In 1965 he saw real bonsai trees for the first time when he traveled to the United States and visited the bonsai collection at the Botanical Garden in Brooklyn. Since then he started learning from books how to design bonsai. His first student was Raphael Shemi and both of them were actually the founders of what will be later called "The Israeli Bonsai Club" (IBC).

Figure 1. Mr. Haim Shir, founding father of the "Israeli Bonsai Club", with Mr. Moshe Emergui.

In 1974 a young man named Amnon Yusting traveled to Japan and returned to Israel after three years fascinated by the aesthetics of the bonsai trees. He learned about bonsai from bonsai books in English and Japanese. He opened the first bonsai nursery in Israel and started growing bonsai and "niwaki". In 1984 he founded together with Uri Arieli a company called "Bonsai Israel Ltd" that marketed bonsai as a gift package called "nishki bonsai" to the Israeli local market and large marketing chains abroad such as "Marks and Spencer", "Gallery Lafayette" and "Migros" in Switzerland. (They came up with a unique idea to offer a long shelf life of potted plants for at least 12 days without auxiliary watering by using inflatable gel

balls). Actually people who were exposed to the fascinating art of bonsai at that time till the 80s were those who traveled to Japan, Europe, South Africa and the United States as a part of their work, or individuals migrating to Israel, learning this art by themselves from books. In general one can say that in those years engaging the art of bonsai was seen as individual enthusiasts here and there, each to himself, with no connection between them. In 1991 Haim Shir and Raphael Shemi together with a group of 10-12 bonsai enthusiasts from central Israel officially founded the Israeli Bonsai Club. This was the first union between individuals to form a group, a community with a common interest, meeting regularly on a monthly basis. A learning process was created, knowledge was accumulated and more and more bonsai members joined in from all over the country to hear and learn about the wonderful art of bonsai. Towards the end of the 90s the club started meeting in one place, a small auditorium in a small village called "Kfar Mordechai" (as is customary in other bonsai clubs around the world). Among the people who contributed greatly to the IBC were the late bonsai artists Samuel Obsfeld and and his wife Tammy (I wish her a long life) who were members of the organizing committee and contributed in holding the club together. On October 2000, the club and Haim as its chairman, organized a bonsai exhibition of about 50 trees that took place at the JBG. The exhibition was open to the public and lectures and demonstrations were also held there by the members and founders of the bonsai club. The success of the event was reflected in an increase in the number of people interested in the bonsai art. In 2002 Haim Shir and Raphael Shemi donated their personal collections, about 200 trees of different species to the JBG, thereby creating the milestone of what was to become in the future collaboration between the JBG and the IBC. Since then the garden has served as a driving force in promoting the bonsai art form in Israel. In 2005 Walter Pall, a professional international bonsai artist from Germany, one of the most popular bonsai artists who has performed on most international stages, was invited to Israel by the IBC to give lectures, workshops and demonstration. Walter Pall was the first foreign master to teach and guide bonsai in Israel. His special way of thinking and perception has fundamentally influenced the understanding of most members of the club in relevant bonsai topics such as maintenance, design, raw material selection and more. The formation of the IBC and these two major steps performed by it have had a decisive influence on shaping the future of the Israeli bonsai. 2005 marks a revolution in the bonsai scene in Israel. One can call it the big bang, I call it "winds of change". In 2008 the Israeli Bonsai Association (IBA) was established by Sagi Baron together with a group of his enthusiast bonsai students and in 2009 he founded the Israeli bonsai academy. The academy hosts Mr. Marc Noelanders twice a year, one of the world top professional bonsai artists, the president of the European Bonsai Association (EBA), and a director in the world bonsai friendship federation. On April 24, 2009, the first "Bonsai conference" was held in the JBG as an outcome of a cooperation process between the IBC and the JBG. The purpose of the conference was learning more about bonsai and exhibiting trees designed by members of the IBC. On the first day of the exhibition several lectures were given by the author of this document covering various bonsai issues, from introduction to the art through to bonsai design. "Bonsai as an art concept" and "bonsai maintenance" was given by Sagi Baron. The lectures were given by members of the IBC who have been practicing bonsai for many years. At the end of the lecture session, bonsai demonstrations were held for the public. The exhibition included trees from 12 bonsai artists, all club members, as well as several trees from the Botanical Garden's bonsai collection, all together more than 50 trees were on display.

Figure 2. Jerusalem Botanical Garden annual Bonsai award and exhibition.

This was the beginning of what later became a tradition, "The JBG annual Bonsai award and exhibition". This annual event promoted (and still is promoting) excellence among local artists, offering them a chance to display their trees to the public, and facilitates ties between the local and international bonsai communities through our visiting international headliners. It has drawn intense interest from artistic circles and the media – TV and press – and has firmly built public awareness about bonsai as an art form, and not as a horticultural curiosity. Following the establishment of the annual JBG exhibition, the management devoted efforts and resources in order to organize and upgrade this activity in a new format, including bringing artists from abroad to demonstration workshops and lectures, as well as by upgrading the display at bonsai events. In 2009 the author of this document was asked by an association for therapeutic gardening to give a lecture for teachers of therapeutic gardening. The lecture was called the "Bonsai as a powerful therapeutic tool".

Towards the end of the previous decade, the art of bonsai became more familiar to the public and young bonsai enthusiasts joined the IBC. At that time many of the prominent and leading Israeli artists of today began their careers in the IBC. In 2012, the JBG decided to update its donated collection, and transform it into a modern sculptural bonsai collection. For this end, the garden enlisted the aid of international bonsai artist Ofer Grunwald as curator of the collection. One of the main focuses of recent curatorial activity has been to secure additional bonsai donations to build a collection that is more widely representative of the local bonsai landscape. The addition of trees donated by additional artists not only enables the collection to serve as a public showcase of the broader Israeli bonsai community, but will assure that the engagement with this community will continue in the years to come.

On the same year, 2012, I invited bonsai master Mr. Min Hsuan Lo from Taiwan to Israel after visiting Taiwan a year before and meeting with him there. That visit had a profound influence on me and upon returning home I decided to share this experience with my colleagues. The biggest bonsai event Israel has ever seen was held in my nursery. The guests of honor in that event were Mr. Hsieh, the cultural attaché Taiwan to Israel, Mr. Liang-jen Chang, an ambassador of the Taiwanese government, who spoke of cooperation and similarities between Israel and Taiwan, and Mr. Min Hsuan Lo, who gave a lecture, a demonstration and three days of workshops on the following days. The event was attended by the members of the three organizations: IBC, IBA and active members of the JBG. The event was very successful. The number of participants was approximately 100 bonsai enthusiasts, a large number in relation to the size of the bonsai community in Israel.

Figure 3. Mr. Liang-jen Chang, an ambassador of the Taiwanese government, Mr. Moshe Emergui from Israel, and master bonsai Mr. Min Hsuan Lo from Taiwan.

Table 1. Significant bonsai activity in Israel since 2005.

Year	Name	State	Activity	Location
2005	Walter Pall	Germany	Demo, lecture, workshops	Israeli Bonsai Club, Kfar Mordechai
2006	Marco Invernizzi	Italy	Demo, workshops	Israeli Bonsai Club, Hod Asharon
2007	Walter Pall	Germany	Demo, lecture, workshops	Israeli Bonsai Club, Hod Asharon
2009	Marc Noelanders	Belgium	Demo, lecture, workshops To this day, twice a year	Israeli Bonsai Association, Tel Yitzhak Bonsaishop, Givat Haen
2009	Moshe Emergui	Israel	Lecture	Israeli Bonsai Club, JBG
	Sagi Baron	Israel	Lecture	Israeli Bonsai Association, JBG
2011	Enrico Savini	Italy	Demo	Jerusalem Botanical Garden
2012	Tony Tickle	UK	Lecture	Jerusalem Botanical Garden
	Enrico Savini	Italy	Demo	
2012	Min Hsuan Lo	Taiwan	Demo, lecture, workshops	Bonsai Art Nursery, Kfar Haroeh
2013	Pavel Slovak	Czech R	Demo	Jerusalem Botanical Garden
	Ofer Grunwald	Israel	Lecture	
2014	Robert Steven	Indonesia	Demo	Jerusalem Botanical Garden
	Owen Reich	USA	Demo	
2015	Nacho Marin	Venezuela	Demo	Jerusalem Botanical Garden
	Moshe Emergui	Israel	Demo	

In 2017, In addition to bonsai courses taught by local bonsai artists, in clubs or in private gatherings, we can see more education of bonsai art in formal institutions such as schools and universities: one of my bonsai students Jonathan Gal started teaching in Oranim academic college as part of a course in therapeutic gardening.

THE CURRENT STATE OF THE ISRAELI BONSAI

The State of Israel is a small country, 8.5 million people vs. 820 million people in the European Union (EU), geographically isolated and far distant from the most active bonsai centers in the world. In the EU the transition from one country to another is free and there is

no need for plants quarantine. This means that the possibilities to develop are enormous in all aspects: study frameworks, clubs, raw materials, local exhibitions, events and international exhibitions. In Israel due to strict procedures and bureaucracy of plants quarantine, the import of bonsai, bonsai raw material or bonsai return from overseas display is not possible. In fact there is no import of bonsai or raw material. We have some bonsai master pieces that can be exhibited at international exhibitions, but we cannot transport them because they cannot be returned from abroad at the end of the event, unless we sell the tree. The geographical limitation and the plants quarantine reduce the possibility of physically exposing bonsai from Israel on international platforms, therefore Israeli bonsai artists who have a tree ready to display cannot participate in international exhibitions in Europe, such as Nolanders trophy, which has an extreme exposure to thousands of visitors from all over the world, simply because the tree cannot be returned. This situation may change in the future if a creative solution to the problem is found. We're exposing today bonsai to the public by using YouTube, Facebook, Instagram and local exhibitions. More exposure of Israeli bonsai will lead people to trying harder. The number of people who have joined the bonsai family has risen in hundred percents since the establishment of the IBC and we expect a lot more to join in the years to come. We can see it clearly in exhibitions and competitions over the years, the graph of development is constantly rising toward quality bonsai, quality raw materials and professional skills. There is highly significant activity, new people join and discover an art that operates on the aesthetic sense involving many art expressions such as sculpture, painting, photography, carving and more. Bonsai and niwaki are still well sold in nurseries to date. The product is consumed as a gift, as a part of a bonsai collection or as an element in the Japanese garden design. Today, there are four bonsai nurseries in Israel. All sell bonsai and mature trees in full size designed in bonsai style.

SHARING KNOWLEDGE

The Israeli bonsai is usually characterized by self-study, short courses, internet and workshops. Some people have invested time and effort finding a local bonsai artist who can teach them bonsai in a more structured way. They are at a higher personal level compared to those who did not take a course or learn the bonsai basics and very few individuals have undergone bonsai training by a master outside Israel. In Israel, it is not customary to train with a master for long periods of time, as in Japan or other countries. Most people see bonsai as a hobby but there are those who see the bonsai as a way of life, or one might say that bonsai is part of their lives. The most significant impact on the Israeli bonsai is the arrival of bonsai masters from abroad, sharing their knowledge by presentations, workshops, demonstrations and sometimes at personal meetings. From each of the bonsai masters we learned something: technique, method, style. They have influenced the Israeli bonsai by teaching knowledge each one of them in a different perspective. Today, more than ever, the wealth of information has been created on a vast network, "just open your mind and learn", but it does not replace frontal physical encounters of any kind, workshops, club meetings and activities that come to enrich us technically. So we initiate encounters with information content to create a knowledgeable stronger bonsai community.

BONSAI RAW MATERIAL

The fact that there is no import of bonsai raw material forces the Israeli bonsai enthusiasts to use local raw materials from regular nurseries, bonsai specific nurseries and yamadori gardens. Sometimes municipalities allow the public to take trees and shrubs from clearing wild areas for construction. In Israel, it is prohibited to take raw materials from nature. In general, with a few exceptions, the average bonsai enthusiast looked for raw material in regular nurseries, or specific nurseries and is unwilling to invest a reasonable amount of money for higher quality raw materials. But recently bonsai enthusiasts are

beginning to understand that, in order to own a good bonsai, they need excellent raw material, one that they dig themselves or buy from a bonsai nursery, and good raw material costs relatively a lot of money. In addition there are few people who know where to find quality raw materials like: olive, lantana, *Elaeagnus pungens*, ulmus, bougainvillea, oak, etc. There are conifers in Israel growing on the mountains, for example *Juniperus excelsa*, and *Juniperus drupacea* that grow on "Mount Hermon" (part of the Golan mountains, rises to 2236 meters), and *Juniperus oxycedrus* in mount "Miron" (part of the Galil). Unfortunately it is beyond our reach. The juniper are protected species, like most plants in Israel and, in addition, there are extensive landmines in big parts of the Golan. Therefore, some people began to grow raw material that will be especially suitable for bonsai in the future.

Figure 4. Bonsai.

IS THERE AN IDENTIFIED STYLE IN THE ISRAELI BONSAI SCENE?

In my opinion the term bonsai style should refer to Japanese modern bonsai style, naturalistic bonsai style, modern bonsai style, etc. Modern bonsai is very contemporary but it is only reasonable to assume that it will change if we consider the global fast world that we live in. Each bonsai style has its own typical fingerprint and so a particular style can be associated with a particular group. In addition, bonsai style is also a personal style of an artist that is defined by uniqueness. This unique style influences the students and the people associated with the artist's style. Style refers to the visual appearance of a bonsai that attributes it to a particular artist. Artists who have a clear style can create followers by producing high-quality bonsai. The dialogue created around those bonsai trees contributes to the formation of a specific style which is associated with an artist or a group of artists.

Israeli bonsai has no distinctive bonsai character as yet. Although it is likely to identify a unique fingerprint to a small number of bonsai practitioners in Israel, it dose not crystallize into a comprehensive Israeli bonsai style. The variety of approaches is sometimes confusing, but over time people adopt their own way, style and uniqueness by using the techniques and concepts that best suit them. Israeli bonsai is influenced not only by classical Japanese bonsai style, but most of us are influenced by several bonsai artists who have stamped their mark on the general perception of how bonsai should be created and how it will look at the end of the process. Some of them practiced in Japan, Taiwan, Europe or their own country, and some did not learn formally but are simply talented. Perhaps masters that their style is identified with the naturalistic style and their trees may not look as meticulous as the Japanese bonsai style but are very persuasive in their conception of nature convincing in their authenticity and belonging to the environment in a realistic way. While not being less impressive than a bonsai masterpiece made according to the Japanese bonsai approach, style.

In Israel, clearly, there are two major groups/schools. The clear division is made

naturally by the exclusive dominance of Mr. Marc Noelanders in the IBA. The second group is the IBC and the JBG that are connected in a long and fruitful relationship and characterized by a variety of artists from all over the world who have visited over the years. In both groups there is learning and style forming. In my opinion one group is with a very clear style influenced by one person and one approach according to his great knowledge and style. It is already possible to see a number of very good bonsai trees made by Mr. Noelanders' Israeli students and there will be more excellent bonsai trees in years to come. The people associated with the IBC and JBG also produce some excellent bonsai trees, but certainly do not have one defined style, instead there are multiple styles and probably not characterized in a clear and familiar style. Israeli enthusiasts adopted different approaches like modern bonsai style, classical Japanese bonsai style, naturalistic bonsai style, and even extreme abstraction reinventing the bonsai as contemporary art. In Israel today there is more than one way to do bonsai, perhaps a mix of styles. At present the Israeli bonsai scene is in formation process. I believe, a number of Israeli bonsai artists will change the Israeli bonsai dramatically, all due to quality trees, well treated, quality raw materials and some new breakthroughs.

Figure 5. Bonsai.

CONCLUSION

The Israeli's bonsai future

Israel, the startup nation, has become in the last few decades one of the most important technological powers in the world. Amazingly, with a little more than 8 million inhabitants, this country has more than 4,000 tech companies. How did such a small and turbulent country become one of the world's innovation leaders? Despite continual conflicts over land and water, fighting for the right to exist, Israel has overcome these challenges and established itself and all this in only 69 years of existence. Israel has achieved the highest number of startup companies per capita, and is second in the number of companies on the NASDAQ. In Israel innovation is a cultural phenomenon. In my opinion Israeli culture is tolerant to failure and promotes innovation and creativity. On the other hand we are not disciplined so lack of discipline leads to independent thinking and unconventional ways to solve problems. Israeli society succeeds in generating world interest in what is happening in our country because of its complex human diversity both culturally and personally. People from all over the world have come to live in Israel since the establishment of the state of Israel and still are coming today from America, South America, all European countries, Australia, South Africa, North Africa and Asia, from where they have brought with them culture and traditions from their

homeland. I believe that the cultural wealth and the soberness that characterizes the Israelis will overwhelmingly affect the Israeli bonsai in the future.

Unity and cooperation are the future. One large strong organization is certainly a factor that will help elevate awareness, expand and spread bonsai art to the public, and will make the public acquainted to this art. The advantages of a uniform and orderly organization are numerous, and this is not unique to bonsai exclusively. Such an organization would have larger, more concentrated financial resources, through which it would be possible to build large exposure to the Israeli bonsai interest. Public exposure through large bonsai events and displays will lead to growth in the future. Therefore, anyone who is interested in promoting the bonsai industry in Israel should support the establishment of such a unified body, whose fruits and successes will benefit not only the contemporary bonsai people but also the new joiners, the younger generation and the Israeli cultural environment. There is no doubt that the Israeli bonsai is expanding, evolving, and improving. It is true that Israeli bonsai is advancing at a slow pace relatively to the other phenomena that develop in this century, but there is clearly an increase in the number of people who are constantly interested in bonsai. In my opinion, at some stage the bonsai art in Israel will receive a big push forward both in the number of excellent trees that bonsai artists and collectors will be holding and hopefully in the creative/artistic aspect. At the same time, a very creative and productive wave will burst out from the young creative minds and possibly professional artists' recognition will be achieved.

Looking forward

The future lies in education, probably to a smarter generation, which is faster, able to reinvent and be groundbreaking. Education and teaching is probably the key to development. Bonsai courses by bonsai artists in any possible framework, will contribute greatly to increase the awareness of bonsai among the general population, especially for the younger generation. In 2018 I will start teaching bonsai at the democratic school in Israel. The democratic education is about a dialogue with the child in which all participants are equal in their importance, children, teachers and parents. It brings democratic values to education and can include self-determination within a community of equals, as well as values like justice, respect and trust, integrating all in the decision-making processes and their implementation where everyone in the community has an equal voice. Israel Oranim academy adopts and embraces the bonsai art, as an art form and as an artistic tool for application in rehabilitation for population with special needs, and integrated bonsai studies into its curriculum. This is a breakthrough which, I hope, will open the door for more initiatives in the bonsai education. I have great faith in the Israeli bonsai people. They want to learn and acquire more knowledge, so what can stop a person from learning and developing? I can foresee a future for some good quality bonsai trees in a number of bonsai artists' private collections that will be excellent in the upcoming years, and naturally could join bonsai trees that deserve to be shown on international platforms. In the next decade I predict a strong professional bonsai scene will grow in Israel.

Bonsai country report of Taiwan, R.O.C.

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Abstract

Bonsai has been developing for over 100 years in Taiwan. Quiet poetry and three-dimensional painting are proper descriptions we call bonsai. Bonsai was originated from China and Japan takes it into the whole world. Japanese bonsai culture was brought into Taiwan when Japan colonized here. Therefore, Taiwan bonsai was deeply affected by Japan. In the initial stages, bonsai was not very popular and just focused on *Ficus* and elm with simple styles. In the 1980s, some bonsai masters introduced various bonsai concepts, skills and books from Japan, which upgraded Taiwan bonsai level very much. In the 1990s, many following bonsai masters started to create and establish "bonsai with Taiwanese characters".

Taiwan is a country located in subtropical regions with plenty of rain, high temperature and moist climate on the island surrounded by hills and mountains. Owing to the differences of the climate caused by the variation of the latitude and the elevation sea level there have been four different environments of the tropic, sub-tropic, temperate and frigid zones suitable for the multiple growth of related plants in each zone, respectively.

Bonsai associations are very sound and well-organized in Taiwan. There are several national bonsai associations, such as "National Bonsai Association of Taiwan", "Taiwan Bonsai Creator Association", "Pine Tree Bonsai Association of R.O.C.", "Taiwan Ficus Bonsai Association" and so on. For example, "National Bonsai Association of Taiwan" is composed of 22 local bonsai associations and holds an annual national bonsai exhibition named "Hwa Fong". All qualified bonsai attending "Hwa Fong" are selected by 22 local bonsai associations through open bonsai contests. All bonsai associations are private organizations without government involved. Many bonsai enthusiasts founded associations based on democratic mechanism and operate independently. That is the reason why bonsai developments in Taiwan are so diversified. Through various bonsai exhibitions, we believe it can encourage people to join in and enjoy these art forms, to share gained knowledge and thereby bring friendship among us.

ABOUT TAIWAN BONSAI

Bonsai is a combination of nature and art. Bonsai is a living work of art and masters utilize plants to express their own thinking and emotion. Masters simulate trees' styles located in nature and minimize trees proportionally into pots. Bonsai is not only a hobby or activity for leisure time but also a process of growing and maturing between human being and plants. Bonsai creation is not only planting a tree but also discovering yourself and fulfilling your desires in mind step by step.

The early styles of Taiwan bonsai were just like the traditional styles of Guangdong and Minnan region of China: tree species are seldom; tree trunks tended to be big and tall; tree shapes were simple and unsophisticated. During the Japanese colonization period, they received many Japanese influences, especially focus on the root allocations, the points of branches growing up, proportional branche sizes, etc. The defects were too uniform and artificial. Every bonsai form was quite similar.

In the 1970s, along with blossoming economy, bonsai art gained much attention and development. The population engaged in bonsai creation and manufacturing were about 150,000 people due to the bonsai fever. More than 10 bonsai exhibitions were held every year by many associations.

Characteristics of Taiwan bonsai culture blend with Chinese thoughts, Japanese bonsai styles, plant management and western aesthetics. It's quite unique. Therefore, Taiwanese bonsai can walk out onto its own path, which causes Taiwanese bonsai to stand successfully upon the stage of bonsai world.

Bonsai trees planted in a restricted space have little soil and no water from nature. Meanwhile, masters have to keep trimming, clipping buds, wiring branches in the bonsai training process. Therefore, sunlight, air, water and soil are the most essential elements for healthy bonsai.

BONSAI ASSOCIATIONS IN TAIWAN AND THE WORLD

The bonsai associations of Taiwan are responsible for bonsai knowledge exchange and promotion. They try their best to bring Taiwan bonsai into international markets. There are unique natural conditions, advanced agricultural techniques and talented bonsai creators in Taiwan. Based on these elements, passion, endeavor and the understanding of international markets, the local bonsai industry can reach a brand-new state.

Bonsai associations are very sound and well-organized in Taiwan. There are several national bonsai associations, such as "National Bonsai Association of Taiwan", "Taiwan Bonsai Creator Association", "Taiwan Pine Bonsai Association", "Taiwan Ficus Bonsai Association" and so on.

There are 18 municipalities and counties in Taiwan and one or two local bonsai associations were founded in each municipality or county. For example, "National Bonsai Association of Taiwan (NBAT)" is composed of 22 local bonsai associations and holds an annual national bonsai exhibition named "Hwa Fong". Therefore, Hwa Fong is the highest quality bonsai exhibition in Taiwan. All qualified bonsai taking part in Hwa Fong are selected by 22 local bonsai associations through open and fair bonsai contests. All judges for bonsai contests are assigned through an open vote in a board meeting of NBAT. And all assigned judges must be members of "Bonsai Judges Association". Accession criteria of a judge is the members have to be a bonsai masters whose bonsai works have won a second place at least two times in Hwa Fong exhibition. In order to establish a fair and open evaluation environment, all judgements are stated on a public bulletin. Every judge has to be responsible for his evaluation on all bonsai. Here are some pictures of bonsai that won the Hwa Fong award. It means champion.

Figure 1. Juniper, winner of Hwa Fong Award 2015. Owner: Chiang Jin Cun.

Figure 2. *Podocarpus*, winner of Hwa Fong Award 2015. Owner: Chiang Jin Cun.

All bonsai associations are private organizations and must register to local or central governments. Many bonsai enthusiasts founded associations based on democratic mechanism and operate independently. That is the reason why bonsai developments in Taiwan are so diversified. Through various bonsai exhibitions, we believe it can encourage people to join in and enjoy these art forms, to share gained knowledge and thereby bring friendship among us.

International bonsai communications are increasing due to globalization. Here are some international bonsai organizations: World Bonsai Friendship Federation (WBFF), Bonsai Clubs International (BCI), Asia-Pacific Bonsai & Suiseki convention and exhibition (ASPAC), Asia Bonsai Friendship Federation (ABFF) and so on.

INTERNATIONAL BONSAI EXHIBITIONS TAIWAN HAS BEEN HOSTING

In Taiwan five international bonsai exhibitions (ABFF, BCI, and ASPAC) took place before, so the achievements of domestic bonsai can be promoted internationally and other countries can recognize Taiwan more.

i. 1999/ ASPAC;
ii. 2006/ ABFF Asia Bonsai Friendship Federation and Hwa-Fong National Bonsai Exhibition;
iii. 2009 /ASPAC and Hwa-Fong National Bonsai Exhibition. At that time the President of Taiwan, Ma Ying Jiu, also attended in person at the conference hall to offer congratulations and then stated, "There are only 23 countries that have diplomatic relations with Taiwan but this event is able to invite 42 country's delegates. It is the best people-to-people diplomacy."
iv. 2010/ Taipei International Flora Exposition/Good Health Pavilion;
v. 2016/ The 11th "Guangdong, Hong Kong, Macao and Taiwan Bonsai Art Exposition" first time hosted by Taiwan;
vi. 2017/ ASPAC, BCI and the Hwa-Fong National Bonsai Exhibition.

Now bonsai enthusiasts from 58 countries are in Taiwan to hold meetings and enjoy bonsai exhibitions.

TYPICAL AND POPULAR BONSAI PLANTS

Now I would like to introduce some species of bonsai materials that are suitable and popular in Taiwan.

Juniper

Juniper is one of the best and popular materials for bonsai creation. It is an evergreen coniferous shrub. The foliage can either be scale-like or needle-like. Scale junipers usually have needle-like foliage when they are young and the typical scale-like foliage appears later. After heavy pruning or bending, overwatering or other stress often juvenile foliage will grow again. Mature trees usually continue to bear some juvenile foliage as well as adult, particularly on shaded shoots low in the crown.

Juniper is very suitable for creating deadwood (jin and shari). This is due to the fact that live veins below a broken or for other reasons dying branch will dry out and die. This results in natural deadwood which is peeled, polished and bleached by climatic conditions and is very durable in case of juniper. The triad of green foliage, reddish-brown bark and silvery white deadwood is very fantastic and gorgeous.

Juniper bonsai will take nearly any form, including informal and formal upright, slanting, and literati. Normally there are some rules for creating assorted bonsai trees. However, the only rule for juniper bonsai is no rule. Even only one branch left, this tree still can be a good bonsai after well training.

Creations of juniper bonsai are infinite. In addition to bonsai skills, what you need is time and patience to create a masterpiece. Following figures can show you how amazing the juniper is.

Figure 3. Procumbent juniper imported from Japan in 1999. Created by Master Chen Chieh Liang.

Figure 4. On the process of creation. Photo taken by Master Chen Chieh Liang in 2000.

Figure 5. Completion of bonsai creation. Photo taken by Master Chen Chieh Liang in 2001.

Figure 6. Taiwan juniper. Photo taken by Master Chen Chieh Liang in 1990.

Figure 7. Taiwan juniper. Photo taken by Master Chen Chieh Liang in 2009.

Figure 8. Taiwan juniper. Photo taken by Master Chen Chieh Liang in 2014.

Ficus

The *Ficus* genus belongs to the family of mulberry plants. They live on all continents in the tropical and subtropical regions and cannot endure frost.

Some *Ficus* can become very large trees with a crown circumference of more than 300 m. Typical for all *Ficus* bonsai species is their milky latex sap, which will leak from wounds or cuts. This latex dries quickly and makes a great sealant. *Ficus* can endure low humidity due to its thick, waxy leaves, but it prefers a higher humidity and needs extremely high humidity to develop aerial roots. Regular pruning is necessary to retain the tree's shape. Leaf pruning can be used to reduce leaf size, as some *Ficus* bonsai species normally grow large leaves.

Special training techniques: *Ficus* has the ability to fuse plant parts that touch each other with some pressure. So branches, roots or trunks can fuse together and form appealing structures. You can use this feature for example to tie a lot of young plants together and let them fuse to build one strong single trunk.

Figure 9. *Ficus*. Created by Master Lee Shien Der in 2014.

Figure 10. *Ficus*. Created by Master Yeh Ming Fong.

Podocarpus

In nature, *Podocarpus* (Buddhist pine) bonsai trees are evergreen shrubs. They usually have straight trunks, horizontal branches and grow from about twelve feet to over 100 feet depending upon the species and locations. At one time, the wood was popular for furniture and column.

The Buddhist pine tree is successful in a variety of growing conditions. Most species do equally well in full sun and semi-shade. They are not bothered by tropical heat and are salt tolerant. Fast draining mixes are good for all bonsai but especially for those less accepting wet feet. If you choose to wire your tree, do so very carefully as older branches tend to be very rigid and can break if too much pressure is applied.

It's recommend that you keep the soil of this bonsai tree slightly moist. You should also supplement misting the leaves of your tree to help increase the humidity around the tree, which will better mimic its natural environment.

There is a slogan in China: 家有一棵羅漢松，一世都輕鬆 It means that if you plant a Buddhist pine around the house, you are able to enjoy a free and easy life. Therefore, Buddhist pine is one of the most popular bonsai trees in recent years.

Figure 11. *Podocarpus*. Created by Master Wu You Shing.

Figure 12. *Podocarpus*. Created by Master Su Zi Chin.

HOW TO POPULARIZE AND PROMOTE BONSAI IN TAIWAN

Someone said that bonsai is a hobby for those who are rich in Taiwan. How to clarify this stereotype is a very important issue for spreading bonsai art?

Spread bonsai into our daily life: to encourage bonsai as a family-oriented activity is essential. If bonsai can enter our community and families, bonsai population and market will be getting a thrive and the status of bonsai art will be higher. There are 22 local bonsai associations in Taiwan, which are composed of bonsai masters and enthusiasts. They are very good human resources to promote bonsai art. Some bonsai nurseries also hold workshops for bonsai beginners. All local bonsai associations organize bonsai exhibitions annually which are very good platforms to show their performances and encourage their aspirations for playing bonsai.

Figure 13. Bonsai workshop by Master Wu Jien Chang.

Push bonsai activities into school: school is the best starting point for knowledge learning, including bonsai. Up to now, there are no official bonsai academic discipline in Taiwan schools so maybe we can promote bonsai art from school associations or general education. Bonsai enthusiasts will be cultivated and its number will increase.

ACQUISITION OF BONSAI MATERIAL

The coverage of forest in Taiwan island is about 60%. Compared to the average rate of all over the world, 30%, Taiwan has very abundant forest resources. Therefore, most of bonsai

materials were collected from the wild in the early stage in Taiwan, such as muraya, premna, celtis, ulmus and so on. But now, because the rise of environmental protection consciousness and yamadori materials are getting less, growing materials are gradually becoming the main source of bonsai, such as juniper, pine and *Podocarpus*. Compared to the countries in temperate zones, Taiwan has an advantage of temperature. We have a warm climate about 3 or even 3.5 quarters of a year. It is quite good for the growing of plants. Compared to the countries in tropical zones, we have winter time to proceed important bonsai works, such as repotting, transplanting, grafting, heavy cutting and so on. Moreover, bonsai masters have very good skills in training materials so Taiwan is certainly one of the best places for growing bonsai materials.

When buying a collected tree, be sure it has been in its current container for at least a year (preferably two). This is a good rule of thumb for purchases of any yamadori! Even though we don't encourage to collect trees from the wild.

Tianwei Highway Garden is the biggest district planned for horticulture industry in Taiwan. The area is about 341 acres where you can find different kinds of horticulture business, such as potted flowers, cut flowers, bonsai, horticulture materials and plants for landscapes among about 400 stores. Now this district is designed to be an agriculture resort and provide some education programs for adults and children such as planting, bonsai creating, stone and wood engraving, and so on. Visitors can rent bicycles and enjoy this big garden. Actually, you can find almost anything regarding horticulture stuff including bonsai, such as plants, tools and material. Besides, there are some other bonsai villages or horticulture market all over Taiwan island. It's quite convenient to acquire stuff for bonsai in Taiwan.

CONCLUSION

Normally training of a bonsai master starts from imitations and then creation. Creation is everything for an artist. It is very important to learn from nature. Trees in nature are our best teachers. Even they always keep silent, you can try to have a dialogue with them. What you see is just an image and a bonsai master has to cogitate how to exchange the image to a real object in pots. If you just copy, the bonsai will become a handicraft instead of a work of art. Various environments cause different styles of trees. When you receive a tree material, it is just like you get a question and you have to find answers. How amazing the answer is depending on your training and experiences.

Figure 14. Juniper, growing and training by Master Bo Tang Liao.

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Singapore bonsai: history, present, and future development

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Abstract

Singapore became independent in 1965 when living conditions were poor, while some elderly people from Chaozhou produced bonsai as a hobby. A local tree species, water plum (*Wrightia religiosa*), was used as the flowers are fragrant and year-round flowering is feasible under controlled conditions. Therefore, water plum production was very popular at that time. It often took at least 5 to 10 years for the completion of potted bonsais, and thus the sale price was high. Seeking plant material is crucial for bonsai cultivation. In 1973, the Singapore Chinese Chamber of Commerce held the first ever bonsai exhibition and the participants included Indonesians and Malaysians. The raw bonsai material have been imported from China, Japan, Taiwan, Malaysia, and Thailand to Singapore. In 1979, I started to import bonsai from Japan and Taiwan. From 1980 to 1990, a large number of bonsai and potted plants were imported from China. In recent years, people can learn bonsai arts from the internet and online learning. The Japanese-style bonsai are arts, while early Chinese bonsai are excellent and time-consuming to produce. Bonsai will not disappear in Singapore, since bonsai is regarded as an important spiritual necessity of life, particularly for the residents in "steel cement" environments.

INTRODUCTION

Going to introduce Singapore bonsai's history, present and future. Singapore is a small country (whole country area around 245 m^2) and does not have any natural resources. It has to depend on other countries for everything, including water. Singapore can only depend on a population of 5 million people to create everything, and all these people migrated from China, Indonesia, Malaysia, Europe, etc. So we can only depend on nurturing human resources to survive. Therefore we are aware we have to learn new skills, work hard, and then can have a good living standard. That is the reason why people are saying Singaporean lifestyle is very stressful and tiring.

Singapore became independent in August 1965. During that time Singaporean living conditions were very poor, living environment commonly poor, there were no high buildings, and the population was about 2 million people, mostly staying in wooden or zinc houses. Despite the poor conditions, some migrants from China, Teochew, still had hobbies like cultivating bonsai. People stayed in a house with a small garden and used it to plant flowers and vegetables. But those Teochew people used Singapore local material, *Wrightia religiosa*, to cultivate bonsai. This material has plenty of flowers and has good fragrance, flowers are white and look like white plum blossom, flowers blossom year-round, and the time of flowering can be controlled, hence Singaporeans like this bonsai very much. But the Teochew people planted all bonsai in a similar style, most of them blended here and there in different angles, and did not have a proper bonsai style.

A good bonsai requires a lot of efforts and takes 5-10 years to cultivate. If a living area is not big enough, only few pots of bonsai can be cultivated. At that time bonsai was not so popular, not many people knew bonsai, normally not many people inquired about bonsai. If somebody liked it and wished to buy it, it was treated as a treasure and people were not willing to sell it. Because of these reasons, our Boh family being attracted by bonsai arts, couldn't obtain bonsai and also could not afford to buy it due to high pricing. From then, we started looking for material to cultivate ourselves.

During that time, we looked for *Wrightia religiosa* material throughout Singapore. From then onwards, we cultivated lots of *Wrightia religiosa* bonsai. At that time less than 20 people in Singapore planted bonsai. About five years later, we imported China Yixing Zisha pots to plant the bonsai. All bonsai pots were from the China Cultural Revolution; quality is the best. Pricing was reasonable.

In 1973 we held the First Bonsai Exhibition in the Chinese Commerce Chamber. Visiting crowd was large: there were Indonesians and Malaysians visiting the bonsai exhibition. During that time, Indonesians, Malaysians and Singaporeans got to know bonsai. Malaysian visitors started to plant large quantity of bonsai material to supply to us. From then Malaysians liked to plant bonsai. In 1987 they specially invited me to teach them bonsai skills and held bonsai exhibitions in Kuala Lumpur and Pengang. Malaysia has a huge area and not so much living stress. Cultivating bonsai conditions are very good. They started to plant bonsai later than Singapore, but developed bonsai better than Singapore. Indonesia and Vietnam are the same.

In the most recent 30 years, due to Singapore developing fast, and bonsai material and space to plant the bonsai material being unavailable, the only way was to import bonsai material from China, Japan, Taiwan, Indonesia and Malaysia. Remember in 1979 I already started to learn and import bonsai from Japan. In the 1980s and 1990s I also imported lots of bonsai and pots from China, then launched in the market for bonsai lovers, to enhance and improve bonsai style. So Singapore bonsai style can be classified as China-Japan bonsai style to become Singapore bonsai style. Regardless of China or Japan bonsai style, most important is the whole look of bonsai shape must be beautiful, then it is a good bonsai.

In the most recent 20 years, due to the well developed internet, the young generation can learn bonsai knowledge online. Understanding of bonsai is better, demand is also higher, shape changes more and more. Overall worldwide bonsai styles are influenced by Japan. As the works are more refined, ratio demands are high, level is clearly defined, dense branches are accepted by public easily.

I personally feel China bonsai in early years had high attainments, modeling quaint nature, had incredible natural beauty, natural and long history of wild material, and went through bonsai master creation to create extraordinary mood.

Today in Singapore the number of bonsai lovers is getting higher compared to 10 years ago. Previously, only 1% of people liked bonsai; now 2% of people appreciates bonsai. As Singapore's young generation is receiving a better education, their appreciation of arts is also improving. Nation development is fast and people's living pace is faster and faster. Following technology pace, living pressure gets higher, and leisure time to plant flowers and bonsai can make people forget about stress and worries.

Another aspect is advanced technology with manufacturing industry growing rapidly. High productivity makes all products' pricing drop, but bonsai is opposite because bonsai requires longer time to cultivate and needs professional skills and ability to enhance the bonsai, using much time to take care to get good bonsai. Besides, good bonsai material is necessary to create good bonsai with good skills, hence bonsai pricing is getting higher and higher, especially premium quality bonsai that needs few generations to cultivate, continue enchancing, non-stop shaping, paying attention to the condition of bonsai growing with good sunlight and water. During this time there cannot be any mistake or negligence. Otherwise the bonsai will get damaged. Hence, a pot of premium bonsai cannot be measured with money.

Future bonsai development in Singapore is very optimistic and positive. Future Singaporeans receive high education and their income is getting higher. Consequently, bonsai appreciation skills and ability will improve too. Living environments are all high buildings, filled with computers, electronics and furnishing. If some nice bonsai can be displayed, it will enhance the beauty of the environment. High standard furnishing and nice bonsai can provide a good sense of feeling. So bonsai culture in the world and in Singapore will not disappear. Future bonsai will become people's spirit necessities.

In the past, Government of Singapore had not paid attention to arts and culture, especially bonsai arts. They had mostly focused on economic developments and neglected the cultivation of arts. But in the last few years there are some improvements. I hope future Singapore Government can encourage Singaporeans to plant more bonsai, and push more people to culture bonsai. Singapore's area is limited and therefore it is not possible to cultivate large areas. To protect the environment there is the need for all to make efforts.

Finally, we hope Singapore Government can support bonsai art activities, like Vietnam Government, where anybody applying for a course to study in a bonsai institute receives USD 400 subsidy. Bonsai society and clubs need to organize more bonsai exhibitions, competitions, bonsai symposia and so on, to encourage bonsai lovers.

I think in another 5-10 years time, Singapore bonsai lovers will easily increase to 5% or even more.

Bonsai in India: a growing movement

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Abstract

Ancient Indian physicians are known to be among the first bonsai artists in the world. Ayurveda, the traditional Indian system of medicine, gave birth to bonsai. According to transcripts, a few physicians, while returning from the Himalayas, brought back with them shoots from medicinal trees. In order to propagate them, the shoots were planted in pots, which grew into trees. As time went by, the physicians trimmed the branches and cut back the roots – making them into a miniature form – thus practising bonsai. As far back as the 12th century, bonsai was known as Vamanatanu Vrikshadi Vidya (science of dwarfing trees) in Sanskrit language in India, when the practice travelled to China it became known as pun-sai – the art of growing single specimen trees in pots. In course of time, bonsai travelled to Japan, where it was further refined till it eventually reached Europe in the 18th century. In the 60s, bonsai returned to India, the country of its origin. Over the years, the art has grown in the country, thanks to pioneers who shared their knowledge by setting up clubs and conducting workshops in major cities. As interest levels grew, more clubs were formed, demonstrations were held, ideas were exchanged and artists were born, taking the art to an advanced level. Our culture and our philosophy with our flora and fauna is seen in all forms of art including our bonsai art. Art is from heart. We have a bonsai culture with more than 100 serious bonsai artists and more than 50 bonsai clubs. India routinely hosts some of the finest bonsai masters from across the world. This report addresses the growing awareness about bonsai in India, how individuals and clubs have overcome challenges and contributed to popularizing the art by working with indigenous plants, developing their unique styles and interpretations of the art form. Our bonsai clubs have a robust annual calendar of exhibitions across major cities – Mumbai alone has at least three bonsai exhibitions every year – encouraging local artists to exchange ideas and offering a platform for peer review. We, in India, have the unique advantage of a tropical climate and have used our imagination to create our own unique styles, adjusting to our indigenous flora and fauna.

INTRODUCTION

It is our pleasure to be in Taiwan and we are honored to be invited and to represent India. Taiwan has some of the best bonsai and we have always found Taiwan a very hospitable country. The brotherhood and warmth of the Taiwanese has touched us and we feel at home in this wonderful country.

Buddham Saranam Gacchami – A Buddhist Mantra

Buddham Saranam Gacchami
I go to the Buddha for refuge (Buddha is the fully enlightened one)
Dhammam Saranam Gacchami
I go to the Dhamma for refuge (His teachings)
Sangham Saranam Gacchami
I go to the Sangha for refuge (The monastic order practiced in Buddhism)
Prakrutim Saranam Gacchami
I go to nature for refuge (The shade of the tree that led to enlightenment)

A TRADITION OF WORSHIPING PLANTS AND TREES

India has always worshipped nature. Traditionally and till date, the Tulsi plant (*Ocimum tenuiflorum*) is worshipped and kept in almost every Hindu home. Tulsi is an aromatic perennial plant in the family *Lamiaceae* which is native to the Indian subcontinent and widespread as a cultivated plant throughout the Southeast Asian tropics. In India, Hindus regarded the plant as an earthly manifestation of the goddess Tulsi.

Banyan *Ficus bengalensis* is worshipped by the married women in India on the festival called Vat Savitri for welfare of family.

BONSAI IN INDIA

Ancient Indian physicians are known to be among the first bonsai artists in the world. Ayurveda, the traditional Indian system of medicine, gave birth to bonsai. According to transcripts, a few physicians, while returning from the Himalayas, brought back with them shoots from medicinal trees. In order to propagate them, the shoots were planted in pots, which grew into trees. As time went by, the physicians trimmed the branches and cut back the roots – making them into a miniature form – thus practicing growing trees in pot. As far

back as the 12th century, it was known as Vamana Tanu Vrikshadi Vidya (science of dwarfing trees) in Sanskrit language in India.

When the practice travelled to China with Buddhism, it became known as pun-sai – the art of growing trees in pots artistically.

In course of time, this art travelled to Japan, where it was further refined and was given the name bonsai till it eventually reached Europe in the 18th century.

In the 60s, bonsai returned to India, the country of its origin. Over the years, the art has grown in the country, thanks to pioneers who shared their knowledge by setting up clubs and conducting workshops in major cities.

INDIA'S BONSAI PIONEERS

Dr. Leila Dhanda played a key role in promoting bonsai culture in India by teaching and guiding the bonsai enthusiasts. She was the nucleus of the association and Dr. Hussain Tayebbhoy was founder President of the Association.

Way back in the 70s, Dr. Ved Prakash Agnihotri was awarded the prestigious Padmashri award, the highest recognition for a bonsai exponent, and his collection of plants graces the Rashtrapati Bhavan (The President of India's Residence) till date.

Mrs. Ratna Thadani and Mrs. Suneeta Vaswani were other pioneers in bonsai, and promoted the art in India. Over the years, they spread knowledge about bonsai to hundreds of enthusiasts, taking the culture to the communities and beyond.

Mrs. Jyoti and Nikunj Parekh co-founded the Indo Japanese Association which has many chapters across the country spreading bonsai.

BONSAI ASSOCIATIONS

Over the years, all across the country of India, a lot of associations and groups have formed in major cities like Mumbai, Delhi, Bhopal, Lucknow, Pune, Vadodra, Bangalore, Trivandrum and Mysore. They are known for conducting monthly workshops and annual exhibitions of bonsai to promote bonsai and engage enthusiasts.

- The Indian Bonsai Association (Delhi) was founded in 1981 by late Dr. Leila Dhanda and Dr. Hussain Tayebbhoy to propagate the art of bonsai.
- The Indian Bonsai Society (Registered), was founded in Mumbai, in 1972. Mrs. Suneeta Vaswani and Mrs. Ratna Thadani along with a group of bonsai enthusiasts mobilized the project.
- The Indo-Japanese Association, a bonsai study group, was co-founded by Mrs. Jyoti and Mr. Nikunj Parekh in 1979.
- The India Friendship Bonsai Society was formed by Ruppa and Sujay Shah along with Urvashi Thacker and Harsha Hinduja in 2000.
- Ssurup Bonsai Group was formed in 2004 for more serious and enthusiast bonsai growers by Ruppa and Sujay Shah with the guidance of Rudy Najoan.

SSURUP BONSAI & GARDENS

In 2000 under the guidance of Master Rudy Najoan from Indonesia we set up the Ssurup Bonsai & Gardens – a totally sustainable, environmental friendly garden for bonsai and learning bonsai art. The garden works on three R's: recycle, reuse and renew. Eco-friendly and self-sustaining, the garden is a perfect example of beauty and efficiency. Spread over 4 acres, the garden has over 500 varieties of rare and unique bonsais, kept meticulously. It is sheer pleasure to view some of the most exclusive and matured bonsai and penjings in this part of the world.

Visits and inputs by way of techniques and design by international experts like Budi Sulistyo, Robert Steven, Yongky Sulistyo, Teddy Boy and Deny Najoan from Indonesia, Pedro Morales from Puerto Rico, Mr. Huang from China, Mr. Chun Sheng Chen from Taiwan, and Mr. Marcos Contaco from Philippines lend an international feel to Ssurup Bonsai Garden.

Among other international bonsai masters who have conducted workshops in India are: Peter Chan, Susumu Nakamura, Hirotishi Saito, Mark Noelander, Solita Chase Rosade Yasuhisa Yamaguchi, Dr. Fujiii Eijiro, Juan Llaga Sony Luna Sergio Luciani, Nacho Marin Ponsevic Ceballos.

BONSAI NAMASTE

It started out as a dream of three individuals; under leadership of Mrs. Prajakta Kale, and supported by Sucheta Avadhani and Kamini Johari. Bonsai Namaste will be having Bonsai Convention and Exhibition in Pune, India, in February 2018, which will give an opportunity to display local bonsai artist's work, meet fellow bonsai enthusiasts and interact with world class bonsai masters.

MATERIALS AND METHODS

Tropical trees of India are used as the key material for making bonsai. Also because of high bonsai enthusiasm, a lot of tropical varieties are collected from different parts of the world unlike other countries where we have seen each country specializes in few varieties.

The plants are cultivated in plant nurseries or by individuals. The propagation method is mostly by cutting and air layering. This is because we have very less or no Yamadori owing to our low water table. This also results in less material that has a lot of roots.

We follow the programming method for trees for basic bonsai material. Basic classic

styles are developed in the following steps in cultivated material. Modern and post-modern styles are created of matured bonsai or once the programming is done.

1. Trunk programming – where the tree is allowed to grow wild in big pots/ground thus forming good thick trunk.
2. Roots programming – once the desired and proportionate thickness is achieved it is repotted in training pots. The tree is trimmed and reduced in height for good taper and is planted in pots that are more broad and have lower height than the previous pot thus trimming the tap root. Eventually the roots are grown in all directions and good roots are ready. Thus a good Nebari is formed.
3. Branches, sub branches and sub sub branches programming – during the above two steps lot of branches are developed which are trimmed on regular intervals so the new growth is compact and internal nodes become nearer. Also the taper and flow is taken care of. The result of which is good taper, flow and canopy.
4. Shaping with clip and grow method and wiring both are popular.

POPULAR BONSAI VARIETIES IN INDIA

Botanical name	Family	Common name
Ficus bengalensis	*Moraceae*	Bargad Banyan
Ficus religiosa	*Moraceae*	Pipal
Ficus glomerulata	*Moraceae*	Umbar
Ficus benjamina	*Moraceae*	Ficus
Ficus retusa	*Moracea*	Ficus
Juniperus	*Cupressaceae*	Juniper
Acacia nilotica	*Mimosae*	Babul
Pithocolobium dulci	*Mimosae*	Vilayati Imli
Tamarindus indica	*Caesalpinia*	Tamarind
Casurina equisetifolia	*Casuarinaceae*	Sharu
Ehretia microphylla	*Boraginaceae*	Wax malpigia, Pala
Podocarpus	*Podocarpaceae*	podocarpus
Schefflera	*Araliaceae*	schefflera
Malphighia coccigera	*Malphighiaceae*	Cherry
Citrus lemon	*Rutaceae*	Lime
Wrightia religiosa	*Apocynaceae*	Wrightia
Murraya	*Rutaceae*	Kamini
Bougainvillea spectabilis	*Nyctaginaeae*	Bougainvel

CHALLENGES

While India is emerging globally in bonsai, we have some disadvantages when it comes to making indigenous bonsai.

- Young and weak plant material;
- Nutritionally poor soil;
- Lack of standardization;
- Bonsai at hobby level;
- Superstitious beliefs.

Plant material

As a practice, students are taught to make pencil-thick plants in a ceramic pot and most students do not graduate to really thick trunks, but we are now concentrating on educating them with thick plant material. Since we are now working on a global platform, we are gearing to meet international standards. We have developed our own unique style, an art from the heart, keeping in mind our flora, fauna, culture and philosophy, to balance the plant visually.

Soil

We need to work upon our soil and after interaction with international bonsai experts, we are making rich bonsai soil, from river granular sand adding burnt rice husk, cow, horse and goat manure, to provide nutrition to our bonsai. We are trying our best to make an indigenous mix for our plants and fine-tuning it according to the size, plant and species requirement.

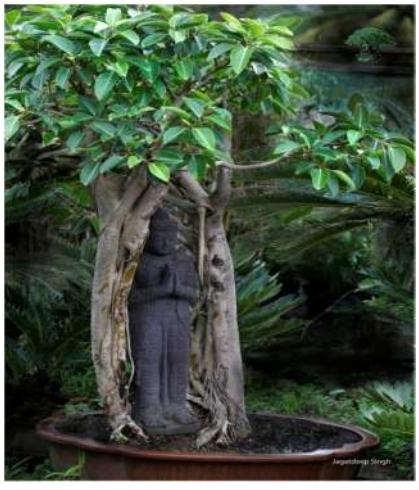
Lack of standardization

As a country, it would be ideal to work upon technical soundness of the plant. All groups can get together and work upon standardization of the soil and plants.

Learning and sharing experiences should be the goal.

Bonsai on just hobby level

Indian bonsai is more a hobby than a professional vocation. There is not much serious work happening. Classes should be held more regularly, the number of plants that one works on should increase, and the word should be spread to increase awareness of bonsai and work on it diligently. We believe that bonsai should be a collective responsibility of the clubs, teachers, seniors and students to promote bonsai. This leads to an opportunity for professional development, a greater amount of seriousness and unified community practice.



Superstitious beliefs

Vastu Shastra, an ancient Indian art, believes that bonsai is not favourable for homes and gardens. For a few years, bonsai was almost shunned but slowly bonsai lovers have proved that even though the tree is small, it gives fruits and flowers like any other 'big' tree.

RESULTS AND DISCUSSION

India is densely populated, which leads to a space crunch, especially in cities. This results in less open space with sunlight, which becomes a limitation for people to tend to their bonsai. This can be solved by encouraging farmers and plant nurseries to grow the material for bonsai.

Bonsai activity should be made career-oriented, which will create interest among the youth, and not just a hobby-oriented art.

More bonsai gardens and museums should be made for its promotion and for more awareness and interest in the country.

Towards this, at Ssurup:

- We are open to sharing information and knowledge on bonsai so that more people gain from this noble art and it becomes a way of life for all segments of society. In a true sense friendship through this living art.
- We would like youth to get back to nature as they lead fast-paced lives and need to unwind. We must introduce bonsai in schools and colleges.
- We are going to start bonsai school for systematic learning and appreciation of the art.

‘Bonsai’, the editing ability with animism and Japanese sensitivity, not only wiring but also imagination of nature

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Abstract

All the animals eat animals and plants to connected life. For human beings, it’s easy to imagine that plants were very important. Brushing up to originally “bonsai” which sublimated horticulture to art, but the simple idea of “I always want plants to be close” is just a feeling of relief by human desire for life sustenance (getting oxygen, and foods). As a behavior not for maintaining life, the sense of feeling “beautiful” when looking at plants is probably only for human beings. The idea of compassion for green is not only oriental, and that one evolved form has sublimated to “bonsai”.

In Japan, there is a Shinto form close to nature worship or spiritual worship (animism) as indigenous faith before the introduction of Buddhism in the 6th century. It promotes the idea that the God exists in all things. It is characterized by being the basis of Japanese people. There may be a strong belief in big trees for Japanese who have a concept of treating big trees in the form of sacred trees, having a shrine at the root of the trees, and having the idea of keeping the regional unity protected.

Japan has been very lucky during a transformation of social order. Most of the new rulers destroyed former culture in the world. But cultural breakdown and destruction with the former rulers were not found in Japanese culture from ancient times.

The high level of editing ability can be cited as a characteristic of Japanese sensitivity. It was good for us to scrape away useless parts from a lot of information, and it was also demonstrated in the field of our bonsai. Over the years, chewing “gardening”, add your own ideas and refine it to what is called “bonsai”.

Keywords: animism, editing ability, stable society, high literacy rate

INTRODUCTION

There are four seasons in Japan, we have hundreds of islands and many endemic species exist because of islanders. The average rainfall in the Japanese archipelago is about 1600 mm, and it has a humid climate and the whole country has conditions for ecologically developing forests. For this reason two-thirds of the country’s land is mountainous area covered with forests. Therefore, it may be the green is always familiar with Japanese.

Brushing up to originally “bonsai” which sublimated horticulture to art, but the simple idea of “I always want plants to be close” is just a feeling of relief by human desire for life sustenance (getting oxygen, leaves, tree nuts and fruits). Also, as a behavior not for maintaining life, the sense of feeling “beautiful” when looking at plants is probably only for human beings.

6,852 islands
From north to south, about 3,000 km
From east to west, about 3,100 km
Island amount area, about 37.8m square meters

About 70% of Japan is mountainous and volcanic area
Average rainfall 1,600 mm year^{-1}

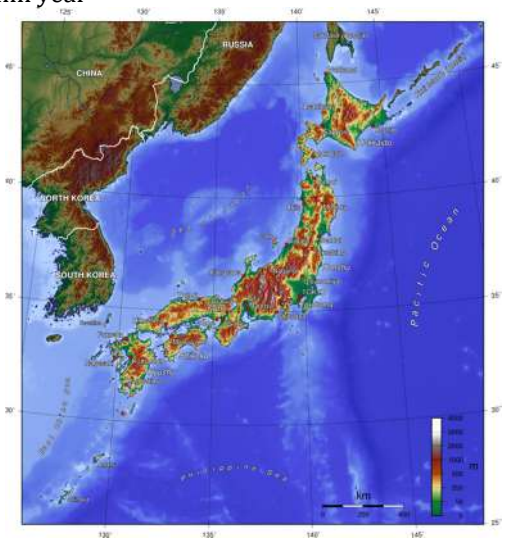

Figure 1. Basic information of Japan.

HISTORY OF JAPAN

Pre-historic of Japan

In Japan, there is a Shinto form close to nature worship or spiritual worship (animism) as indigenous faith before the introduction of Buddhism in the 6th century. It promotes the idea that the God exists in all things. It is characterized by being the basis of Japanese people.

There may be a strong belief in big trees for Japanese who have a concept of treating big trees in the form of sacred trees, having a shrine at the root of the trees, and having the idea of keeping the regional unity protected.

And it is worshiped as a sacred tree with a straw tie-line 'Shime-nawa'. Meaning is the same as sumo wrestlers, something big or something strong avoid evil from us (Figure 2).

Figure 2. Straw tie-line 'Shime-nawa'.

In the 7th century, Japan brought many items back home by many ambassadors and international students who tried to absorb culture, customs and technology at Chang'an, the capital of Sui Empire and Tang Empire, one of the world's most advanced cities. It is a famous story that there were things that put plants in the pot.

I think that it was one of the methods for planting rare trees alive using a pot in order to giving a present for wealthy people of China at that time. I think that at the time it was the forefront of the native culture and the trendy and cool hobby of the Heian period (Figure 3). Thereafter, the envoy of envoys and envoys is abolished, and the bonsai is being sharpened with a feeling unique to Japan.

The high level of editing ability can be cited as a characteristic of Japanese sensitivity. It was good for us to scrape away useless parts from a lot of information, and it was also demonstrated in the field of our bonsai. Over the years, chewing "gardening", add your own ideas and refine it to what is called "bonsai". I would like to explain the process with a long history.

Figure 3. Importing culture from Tang.

The emergence of our editing sensibility

We can find a 12th century scene in a very famous old story called "Hachi-no-ki". The story is like this. A travelling monk begged a one night stay to a local samurai in deep snow at night. First, he refused because he was so poor and could not offer hospitality. But the deep

snow made the monk go, he welcomed him to stay but he had few food and no firewood to burn to get warm at night. He used to be a wealthy local samurai but embezzlement of relatives made everything gone. Only three bonsais remained of his prosperity. So the samurai decided the bonsais to be firewood for the hospitality. Those were his favorite hobby, he maintained them for years and years, such as bending the branch and pruning some leaves.

After the nobleman period, you can see that bonsai penetrated into the samurai class until the 12th century (Figure 4). Samurai, the new govern class, interwrapped nobleman, as a new ruler.

Figure 4. The scene of the hospitality.

When there is a transformation of social order, most of the new rulers destroyed former culture. But cultural breakdown and destruction with the former rulers were not found in Japanese culture from ancient times.

It is noteworthy that bonsai has been established and influenced with the tea ceremony and flower arrangement style as one of the preferences of the character of the Japanese.

However, expanding the 'culture' needs society to be stable.

I believe the culture exists beyond the war, dispute and chaos. "A man with no regular occupation can have no stability of mind." "Well fed, well bred." is a famous proverb. It was very fortunate that there were many important stable periods in which culture blossomed in Japan.

Expanding to the citizens using publishment

The people of Edo, the 17th to 19th century, have improved their breeds by on-the-job experience and were very enthusiastic about genetics. Improvement of woodblock printing technology (multicolored printing planning method established) spread these achievements to every corner of Japan. Then, the many kinds of breeding improvements pass through not only Momiji and cherry blossoms but also Japanese rhodea, orchid, etc. in various plants, by Ukiyo-e or gardening books (Figure 5).

Figure 5. Ukiyo-e of flower stalls.

As a complex element, high literacy rate of Edo period is remarkable and noteworthy. Not only the ruling class but also the common people, regardless of gender, were able to read and write, helping the transmission by publications, contributing to the discovery of rare plants peculiar to each place. This is inferring that there was a synergistic effect of encouraging discovery (Figure 6).

Figure 6. Learning scenery in the Edo period.

The Edo period overlaps with the time when the ruling class of each province, named 'Daimyo', competed to create a garden. The progress of the landscaping technique thereby contributed also to the improvement of the technology of gardening. Many Daimyo made landscape-garden their hobby. It is also a feature and influence of the Edo period.

This is also where we can find in a document that Daimyo carried a bonsai as one of the handicrafts at the time of the commuter exchange from Edo to their area. And gardening was recognized as one of the hobbies through the Daimyo to the common people. That contributed to the prosperity of the bonsai.

In the transformation period from Edo to Meiji, bonsai was avoided because of antipathy for nostalgia. There was an atmosphere of 'Deny all past'.

As time goes by, bonsai was one of the preferences of politicians and other millionaire people during the Meiji era to the early Showa period. It is also interesting that women's social advancement also became popular, and bonsai was one of the cultures in addition to tea ceremony, flower arrangement, etc. for women and children of wealthy people.

In addition, there was the technological innovation in bonsai in the early 20th century of using wire. Before that, a branch was bent using rope or a cutting with scissors. With wires such as copper wire and iron wire, the branching method was developed. As a result, it can be easily guessed that technical personnel has also helped to specialize for bonsai.

20th century, the century of the exhibition

During the bonsai exhibition in the early 20th century, the Japanese bonsai society campaigned to establish bonsai as an art. It is the reason why we keep sticking to the holding at the Tokyo metropolitan museum, holding the philosophy of "Kokufu bonsai exhibition" that continues even now, "Bonsai is a living art". In addition, it can be said that it is actually noteworthy to record the photos of the exhibition trees. It can be said that Japan's strength is that it continues to spell things that can be material for future generations, such as a lot of exhibitions, tree stature, owner's itinerant history.

During World War 2, bonsai was regarded as a luxury item. So, most bonsais were hidden in the mountains. They couldn't be watered in the daytime, only at midnight. It is too hard for bonsai to be kept alive in an unstable society. That's why Mr. Saburo Kato said bonsai is a symbol of 'Peace'.

After World War 2, Japan began to focus on economic growth throughout the country, regretting on militarism, and the period of stable growth of society has been relatively long. Naturally, as the stability period continues, culture has also progressed and this has had a positive impact on the bonsai world as well.

In addition, the bonsai magazines devised a revised article to refine the development of technological innovation and sensitivity through focusing on many bonsai engineers such as Mr. Masahiko Kimura. There is no doubt he had a great impact on raising the bonsai world.

As you can see through the Kokufu books, it turns out that the way of showing bonsai is clearly different from 30 years ago, 50 years ago, and 80 years ago. You will be able to see the completed forms of contemporary exhibition bonsai (Figure 7).

Figure 7. Compare the contemporary exhibition bonsai.

About 40 years ago, a displaying study group called 'Kei-do' was founded. This group advocated and educated for exhibiting bonsai manner "Kei-do" at the place of "Toko-no-ma", the Japanese alcove. They pursued "bonsai is art and symbol of Peace" comparable to the tea ceremony or Japanese traditional flower arrangement. The Kei-do bonsai style is little different from the exhibition bonsai. That's so interesting (Figure 8).

Figure 8. Displaying study group 'Kei-do' exhibits.

EVOLUTION OF JAPANESE SENSIBILITY IN THE FUTURE

If Japanese people hear the sound "bonsai", their brain already has a visual image of plant in pot bonsai. I feel that Japanese bonsai is mature until such a stage.

I believe for the future of Japanese bonsai world, at first, we should deeply understand that "bonsai is an art".

And we, Japanese, can demonstrate the expression of bonsai, not only the technique, but concerns based on knowledge and sensibility of art. It is desirable to develop an environment where bonsai specialists and enthusiasts as well as critics grow like painting circles.

I'm sure the Japanese bonsai has long been cultivated. "The scrapping of wasteful things, the thoroughness of the truth, the appearance of being more natural than nature" was embodied indeed.

Bonsai will continue to evolve while incorporating new ideas. I just get excited even if you just imagine what kind of bonsai there will be in the future. The way of thinking and expression for bonsai will change or should change from now.

The Japanese bonsai will be still evolving forever!

Juniper bonsai of nowadays and future in Taiwan: evaluating circumstances and improving cultivation

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Abstract

Junipers have been developed in 50 years, and have become one of the most important bonsai species in Taiwan. Millions of juniper bonsai have been produced recently by Taiwan growers. Various shapes are seen from the awarded junipers from national exhibitions. In the meantime, it would not be difficult to find the homogeneity and restrictions in recent years. The improvements on junipers are really remarkable in terms of scale, shape, and performance. There are many predecessors and successors devoted to the skill of making juniper bonsai. At the beginning, one-side Japanese ideas and thoughts were brought in. A new thing is stunning, but disappointing due to the lack of comprehensive knowledge. Fortunately, dedicators seek better understanding of cultivation as the junipers are so attractive. "Silk carving", a special skill, is considered a representative for Taiwan juniper bonsai. Although those people really make the efforts, they always have only mentioned skills of making a juniper bonsai from the material stage. Even at current bonsai exhibitions, the source materials of juniper bonsai were cultivated by particular people 40 to 50 years ago. As a result, all the awarded juniper bonsai have similar trunks which were fixed by primary cultivators, especially in recent years. There are lots of causes leading to the consequences such as economic factors, lacking cognition and methods. Junipers are so strong and flexible that they can be shaped in some effective ways. Accordingly, propositions could be made as innovations, for instance, performances of grafting, nursery, and cutting. These possibilities present a good future for juniper bonsai.

Keywords: juniper, cultivation, homogeneity, silk carving, innovation, future

INTRODUCTION

Juniper is important for bonsai in Taiwan, and there is a specific variety of juniper: Taiwan juniper. It has been cultivated for 60 years, and there are five significant periods. Japanese and celebrities started Taiwan juniper history. The masters of cultivation and shari carving turned up to make Taiwan juniper bustling. As the name (Taiwan juniper) includes "Taiwan", it should represent a native species. However, Taiwan juniper cannot be found in Taiwan, and it seems to be a mystery.

Along with Taiwan juniper becoming more popular, there are new or improved skills. Especially "silk carving" almost could represent Taiwan juniper. These techniques were shown on Hwa-Fong national exhibitions. There are always lots of Taiwan junipers at Hwa-Fong exhibitions. It shows how serious Taiwan junipers were taken. From these numerous juniper bonsai, comparison could be made to understand what is developing and what is constant. The solid features should be rethought for new ways.

BACKGROUND

"Taiwan juniper" has become one of the most important bonsai species in decades. However, juniper has already been taken as bonsai in at least 60 years in Taiwan, and has been through specific periods:

Beginning

In about the 1950s, there was so much information about all species of bonsai from Japan, and bonsai emerged from imitations. Especially, juniper is named “the king of bonsai” by Japanese because of “shari”, multi-mold, and flourishing. Juniper is so eye-catching that it is focused by Taiwanese. Unfortunately, it was not easy to translate language and realize differences of innate conditions, such as weather, soil, and nursery methods. As a result, most of this information was unilateral (and even wrong), and many bonsai were failed and sometimes died. During this period, people were muddled and ignorant, but were ambitious and unbeatable.

Growth

Cultivators and bonsai keepers commenced learning from experiences, and got used to take care of juniper bonsai in the 1960s. Further, there was a great improvement on skills of cultivation. People started to create different shapes of junipers. According to these experiences and creations, juniper bonsai with good view were coming out. People were readily attracted, and more people joined the market. The price of juniper increased from this moment. It is worthy to mention one man, Chang Dai-Chien, who is well-known as a great painter. Actually he loved bonsai so much, and even brought his own bonsai from China. Most of these bonsai were red pines and junipers. The nimbus brought juniper lots of advantages.

Figure 1. There are a lot of juniper planted by master Chung.

Prosperity

In the next decade, the importers found a great market for Japanese juniper, and there were lots of Japan juniper showing off. These Japanese bonsai were so expensive (at the moment for Taiwanese) that Taiwan juniper was promoted, which was much cheaper. For the high economic value, juniper was taken as rising star of bonsai, therefore, more and more people devoted themselves to cultivation of juniper. Several master cultivators, such as Mr. Wu and Mr. Huang (a.k.a. 吳川益and 黃大鸞, stayed ahead of the competition. They had even established general shape of juniper until now.

Recession

In the 1980s, more junipers were brought into the market, but many of them were not qualified as bonsai. Over-production and low quality rapidly impacted juniper market, and made buyers step back. Meanwhile, juniper has a special feature, juvenile leaves, which means immature juniper leaves, are needle-like. Nobody likes getting hurt by leaves. There were some people rejecting juniper. All the drawbacks were unveiled at the same time, and the market was frozen at a low.

Ascendant

Along with founded exhibitions, juniper really made remarkable records. In the 1990s, every place started to set up their associations. The national association was also established in 1994, and held an exhibition, called Hwa-Fong national exhibition, in the next year. Juniper bonsai is always remarkable, and there are only five years without awarded juniper bonsai in a total of 21 times exhibitions so far. Furthermore, bonsai masters established their own reputation through awards or displays, and more followers appeared later. Because of the fine records and masterpieces, juniper caught everyone's eyes again.

CLASSIFICATION

General name

This article focuses on "Taiwan juniper", which means a specific kind of juniper that Taiwanese always take as bonsai source. However, this breed cannot be found in the wild. It is strange to name this as "Taiwan juniper", but this fault has been used in 30 years at least. Regardless of the mistake, "Taiwan juniper" has already become commonly known by Taiwanese and foreigners.

Unknown origin

As the faulty is almost certain, the question, where juniper is coming from, should be realized. Unfortunately, there is no academic research on it. In the author's experience, there is an alike juniper variety in southern China, but it is not all the same. From the seniors' words, "Taiwan juniper" is an exotic breed, and was brought by Japanese. It is a pity that all Japanese juniper breeds are not same, even not similar, with Taiwan juniper. It is still a mystery. Some scholars believe that Japanese brought a foreign juniper breed (not a Japanese one), which had changed some features along the weather in Taiwan. As a result, it could be said that Taiwan juniper is unique among juniper breeds we know so far.

TECHNIQUES

Copycat

Since all the knowledge came from Japan at the beginning, it is not avoidable that imitations became the fastest technique to make bonsai. Especially, there are many famous masterpieces in Japan, and people always try to follow these masters. Masahiro Kimura seems to be the best and godlike, and people always associate him with Japanese juniper. Every bonsai-maker always learns his works by heart. The effect of copycat is so obvious that one masterpiece may have several alike twins. Taiwan juniper gets promotion immediately. After all, these works are simulations, and it would be judged lacking of creativity and personality.

Cultivating innovation

Usually, junipers cannot be propagated by seeds (there are some hard conditions, such as lime soil) but by "cuttages", which means breeding from using vegetative twigs. This method indeed highly increases, but the consequence is not satisfying. The most important

feature of juniper would be its twisted and spinning trunk, and a straight one would be criticized as a defect for juniper bonsai. The growth of Taiwan juniper is too fast to be controlled. If cuttage is used as a breeding process, there is always a straight trunk. For solving the problem, a special technique, "layering after twisting", is adopted. Layering is another skill frequently used to propagate, but the method is too complicated to increase numbers. "Layering after twisting" indicates that layering is adopted, but twisting the trunk has been done before layering. When a plant with twisted trunk is brought up, it is highly possible to grow as a conditional juniper bonsai. The obvious disadvantage of this technique is that a plant grows much more slowly after being twisted.

Heavily-reliance of wires

A twisted trunk is important, and it shows that wires are so necessary. Wiring is definitely the best way to do twisting and to make different shapes. The wood fibers of juniper are particularly with extension, and wires help to curve. As long as branches can be bent, wires can be used to protect branches from breaking. According to the method, juniper can be made in any shape. However, there is an enormous problem that branches may be weak and drooping without holding by wires.

"Silk carving"

"Silk carving" is a technique to make silk-like "shari" through carving wood by hand, and electric tools should be avoided if possible. Silk texture means that the dead wood ("shari") in nature is filiform, just like silk. This emphasized that shari should be made as nature junipers, and there should be no tool (knife) mark. "Silk carving" is a skill brought up by Mr. Lee (a.k.a. 林老闆) for about twenty years, and it causes Taiwan juniper to become visible. However, Taiwan juniper is a breeding production, and is not as old as junipers in the wild. Because wild junipers grow so slow that the fibers of xylem could be extremely tiny, this kind of wood could be fairly waterproof. Oppositely, the dead wood (shari) of Taiwan juniper is not strong enough. This means shari may be rotten, and "silk carving" would be done in vain.

Extremely bent branches

The wood of Taiwan junipers is not strong but ductile. Taiwan juniper is moldable and can be bent in extreme ways. Ripping off the branch makes two or more parts which can be easily bent. Scooping out the old xylem of branches forms hollow branches that could be shaped into different styles.

Figure 2. This is a juniper in the wild. This is the ideal for "silk carving".

Figure 3. This is the way to process “silk carving”.

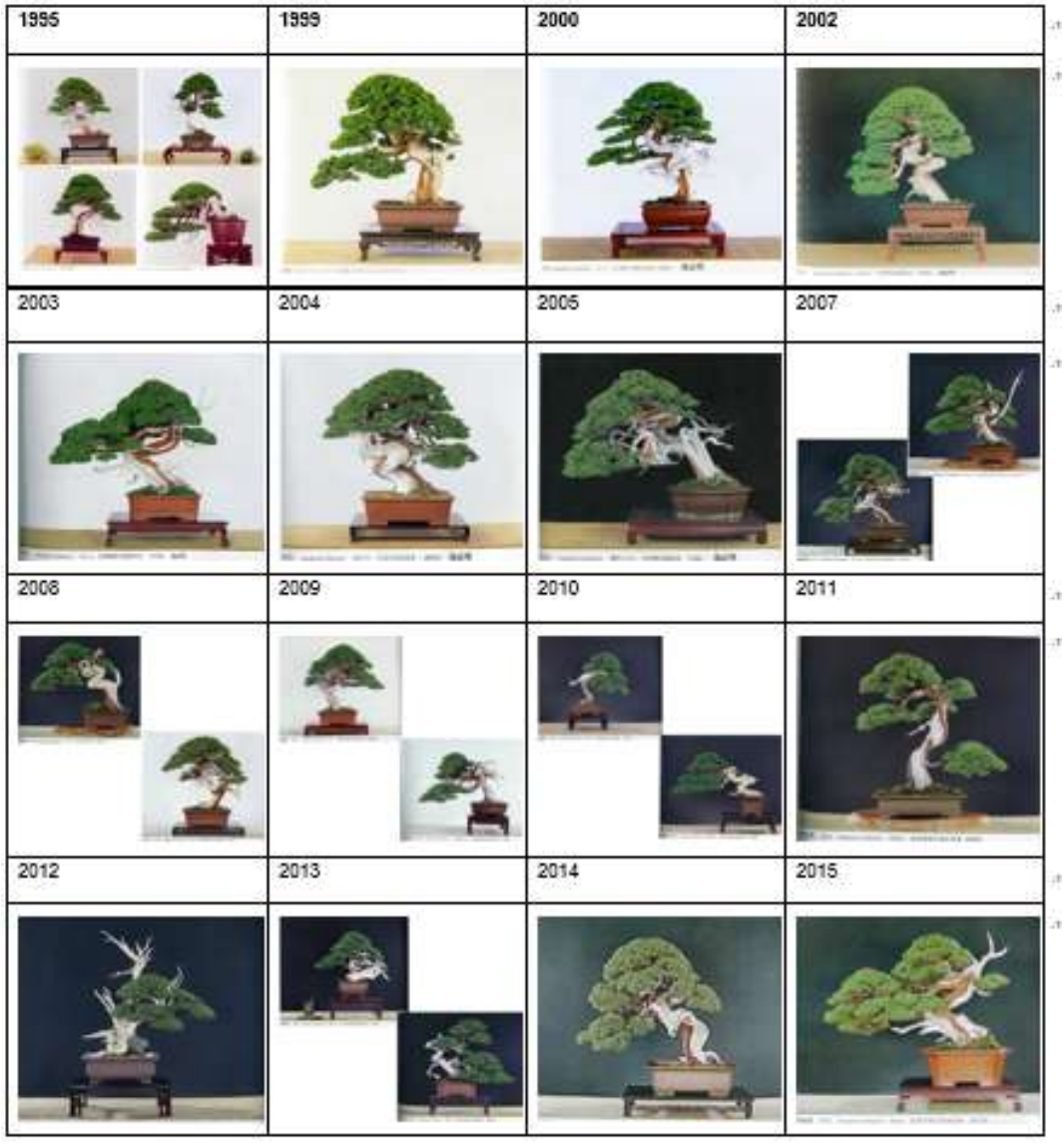
Figure 4. Before doing silk carving (left), complete the carving (right).

JUNIPERS ON HWA-FONG EXHIBITIONS

Selection quantity

年份	**95’**	**97’**	**98’**	**99’**	**00’**	**01’**	**02’**
入選數/得獎	10 (4)	22 (0)	10 (0)	18 (1)	13 (1)	18 (0)	16 (1)
年份	**03’**	**04’**	**05’**	**06’**	**07’**	**08’**	**09’**
入選數/得獎	18 (1)	18 (1)	18 (1)	11 (0)	11 (2)	10 (2)	14 (2)
年份	**10’**	**11’**	**12’**	**13’**	**14’**	**15’**	
入選數/得獎	11 (2)	11 (1)	8 (1)	11 (2)	10 (1)	13 (1)	

As can be seen on the above chart, it is apparent that there were slightly more juniper bonsai that were selected in the exhibitions before 2005. The average is at 16.1. The amount of selected bonsai in every exhibition is about 115. It means that there is one juniper in every 6 to 7 bonsai. After 2006, the total selection goes down, but there are more awarded juniper bonsai. It can be explained that juniper bonsai are selected more carefully but with higher quality.



Comparison and homogeneity

The above table shows all awarded juniper bonsai in each year. In these two decades, the arrangements of carving part (shari) and life-line have not changed a lot. There is a notable difference on the leaves between 1995~2010 and 2011~2015. Before 2010, the scale of the foliage is large, but there are infrequent leaves on these. On the contrary, the scale of the foliage is much smaller, but the foliage is dense. It shows that the nurse of the foliage was valued and cared for. The awarded bonsai in 2003 and 2015 are the same, but there are some differences. The foliage of the 2015 awarded bonsai was separated into sections, and looks more vivid and designy.

To see through all the awarded bonsai, juniper is changeable and moldable, but there is something monotonous. Most main trunks which are close to the root have a long and straight part. Because all juniper bonsai are cultivated and grow fast, main trunks cannot be controlled well. Furthermore, a straight trunk would restrict the mold of bonsai, such as cliff style which

needs a downward curve to hang the cliff. This problem will be discussed later.

NEW PROBLEMS

Taiwan juniper has been popular for 20 years, and the business is also getting thriving. However, more productions have come out, and there are more problems.

Immature leaves

Juniper has two types of leaves: mature and immature leaves. Mature leaves are scale-like and tiny. On the contrary, immature leaves called "juvenile leaves" are needle-like and longer. Mature ones are much better for bonsai. Some junipers are all with mature leaves, and some only have juvenile leaves. The others have both kinds of leaves, and Taiwan juniper is obvious one of these.

The above picture is a typical Taiwan juniper with the two types of leaves at the same time. The leaves on the most left side are mature leaves. On the other hand, the rest of the leaves are juvenile. The leaves of Taiwan juniper easily become juvenile from mature. This is a big problem for bonsai. There are several reasons to explain the leaf change:

- Lack of sunlight: sunlight is necessary for plants to perform self water-cycle and produce nutrition;
- Over or under fertilizing are both damaging plants;
- Over watering: too much water makes the leaves of plants bigger and longer, but Taiwan juniper would make its leaves juvenile;
- Any kinds of external damages, such as man-made, insects, plant diseases, weather or region changing, drive Taiwan juniper to change leaves.

Decay of dead wood (shari)

As the dead wood (shari) of Taiwan juniper is not strong enough, it may rot quickly. It can be so serious that all the shari disappear. A juniper could be hollow. Another with two or three life-lines may disintegrate and divide into two or three plants. Fortunately, shari can be protected by spreading lime-sulfur frequently. However, a Taiwan juniper sold to some countries with a long rainy season may decay so fast that protections cannot be performed in time.

SUGGESTIONS

Cultivation re-innovation

"Layering after twisting" can make a trunk curve, but this will not include the part which is close to the root. This is because a curving plantlet still grows in a straight way. If the upright plant could be lay down, there would be a different shape. Transplanting frequently and changing the angles should make creations, but these actions would hold back the growth.

Life-line (water-line) design

As can be seen from all Hwa-Fong awarded juniper bonsai, life-lines were all arranged along the fiber-line (wood grain). However, this is not the way it should be. Life-lines could be arranged in a different direction and would be used to create a style.

CONCLUSION

In the history of Taiwan juniper, there are ups and downs, and lots of things can be learned. The strength and weakness can be distinguished. Especially, the recession should be sincerely understood. Because there are so many juniper cultivators now, over-production may happen again.

Taiwan juniper is a well-known variety, but is misunderstood as a native plant. Scholars should pay attention to it. This would not influence the reputation of Taiwan juniper. The masters with techniques made efforts on it.

Seeing through all awarded juniper bonsai on Hwa-Fong, lower trunks are always straight. Therefore, Taiwan juniper would be restricted by fixed part, so suggestions should be given to make innovations. Fortunately, Taiwan juniper is so flexible that there are many possibilities that could be tried. Further, new problems coming out for any factor challenge us all the time, and this is also the reason why Taiwan juniper always leads bonsai exhibitions.

Diversity of native bonsai plant in Taiwan

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Abstract

Taiwan has a high biodiversity, as it is located between Holarctic Kingdom and Paleotropical Kingdom, with many mountains higher than 3,000 m. Abundant bonsai plant material in Taiwan could be used or selected from approximately 4,000 native species of the rich vascular flora. After visiting the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung from 2013 to 2017, the authors recorded 101 species (including 6 varieties) of native bonsai plants. These plants belong to 38 families and 65 genera in total (including 3 families, 5 genera, 9 species, and 3 varieties in gymnospermae; 35 families, 60 genera, 92 species, and 3 varieties in angiospermae). By plant habit, most bonsai plants are tree or shrub type, but there are some special types, such as *Ficus pumila* var. *pumila*, *Ficus tinctoria*, *Rosa taiwanensis*, *Sageretia thea*, and *Elaeagnus formosana* that belong to scadent shrubs; *Ficus vaccinioides* that belongs to creeping shrubs; and *Callerya reticulate*, *Hiptage benghalensis*, *Berchemia lineate*, *Vitis thunbergii* var. *taiwaniana*, *Elaeagnus glabra*, *Gymnema sylvestre*, Littleleaf Indianmulberry (*Morinda parvifolia*), and *Lonicera japonica* that belong to woody vines.

Keywords: Taiwan, native bonsai plant, diversity

INTRODUCTION

Taiwan has a high biodiversity, as it is located between Holarctic Kingdom and Paleotropical Kingdom, with many mountains higher than 3,000 m. Abundant bonsai plant material in Taiwan could be used or selected from the nearly 4,000 native species of the rich vascular flora.

METHOD

The authors visited the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung from 2013 to 2017.

RESULT AND DISCUSSION

The authors recorded 101 species (including 6 varieties) of native bonsai plants, which belong to 38 families and 65 genera in total (including 3 families, 5 genera, 9 species, and 3 varieties in gymnospermae; 35 families, 60 genera, 92 species, and 3 varieties in angiospermae) (Table 1).

Table 1. Diversity of native plants used for bonsai in Taiwan.

Scientific name	Habit[a]	Geography[b]	Plant type[c]	Note
GYMNOSPERMAE				
PODOCARPACEAE				
Nageia nagi (Thunb.) O. Ktze.	t	H	G	
Podocarpus costalis Presl	t	P	G	
Podocarpus macrophyllus (Thunb.) Sweet var. *macrophyllus*	t	P	G	
Podocarpus macrophyllus (Thunb.) Sweet var. *maki* Sieb. & Zucc.	t	H	G	
PINACEAE				
Pinus massoniana Lambert	t	H	G	
Pinus morrisonicola Hayata	t	H	G	
Pseudotsuga wilsoniana Hayata	t	H	G	
CUPRESSACEAE				
Juniperus formosana Hayata var. *concolor* Hayata	cs	H	G	rootstock
ANGIOSPERMAE				
BETULACEAE				
Carpinus kawakamii Hayata	t	H	D	
FAGACEAE				
Quercus tarokoensis	t	H	E	
Quercus variabilis Bl.	t	H	D	
ULMACEAE				
Celtis biondii Pamp.	t	H	D	
Celtis formosana Hayata	t	H	D	
Celtis nervosa Hemsl.	t	P	D	
Celtis sinensis Pers	t	H	D	
Ulmus parvifolia Jacq.	t	H	D	
Ulmus parvifolia Jacq. 'Rainbow'	t	cv.	D	
Zelkova serrata (Thunb.) Makino	t	H	D	
MORACEAE				
Ficus ampelas Burm. f.	t	H	E	
Ficus microcarpa L. f.	t	H	E	
Ficus microcarpa L. f. 'I-Non'	t	cv.	E	
Ficus microcarpa L. f. var. *crassifolia* (Shieh) Liao	t	P	E	
Ficus microcarpa L. f. var. *pusillifolia* Liao	t	H	E	
Ficus pedunculosa Miq. var. *mearnsii* (Merr.) Corner	cs	P	E	
Ficus pubinervis Bl.	t	P	E	
Ficus pumila var. *pumila*	cs	H	E	
Ficus superba (Miq.) Miq. var. *japonica* Miq.	t	H	D	
Ficus tinctoria Forst. f.	ss	P	E	
Ficus vaccinioides Hemsl. ex King	cs	H	E	
Ficus virgata Reinw. ex Bl.	t	H	E	
LAURACEAE				
Machilus obovatifolia (Hayata) Kanehira & Sasaki	t	P	E	
THEACEAE				
Eurya emarginata (Thunb.) Makino	s	H	E	
Eurya glaberrima Hayata	s	H	E	
HAMAMELIDACEAE				
Distylium gracile Nakai	s	H	E	
Distylium racemosum Sieb. & Zucc.	t	P	E	
Liquidambar formosana Hance	t	H	D	
ROSACEAE				
Prunus japonica Thunb.	s	H	D	
Prunus mume (Sieb.) Sieb & Zucc. var. *formosana* Masamune ex Kudo & Masamune	t	H	D	rootstock
Pyracantha koidzumii (Hayata) Rehder	s	H	E	
Pyrus calleryana Decne.	t	H	D	
Rosa taiwanensis Nakai	ss	H	E	

Table 1. Continued.

Scientific name	Habit[a]	Geography[b]	Plant type[c]	Note
LEGUMINOSAE				
Callerya reticulata (Benth.) Schot	wv	H	E	
Dendrolobium dispermum (Hay.) Schindl.	s	P	E	
EUPHORBIACEAE				
Antidesma pentandrum Merr. var. *barbatum* (Presl) Merr.	s	P	E	
Breynia officinalis Hemsley	s	H	E	
Flueggea virosa (Roxb. ex Willd.) Voigt	s	H	D	
Gelonium aequoreum Hance	t	P	E	
Phyllanthus multiflorus Willd.	ss	H	D	
RUTACEAE				
Murraya paniculata (L.) Jack.	s	H	E	
Murraya paniculata (L.) Jack. var. *omphalocarpa* (Hayata) Swingle	s	P	E	
Severinia buxifolia (Poir.) Tenore	s	P	E	
MALPIGHIACEAE				
Hiptage benghalensis (L.) Kurz.	wv	H	E	
ANACARDIACEAE		H		
Pistacia chinensis Bunge	t	H	D	
ACERACEAE				
Acer albopurpurascens Hayata	t	H	E	
Acer buergerianum Miq var. *formosanum* (Hayata) Sasaki	t	H	D	
Acer palmatum Thunb.	t	H	D	
Acer serrulatum Hayata	t	H	D	
AQUIFOLIACEAE				
Ilex asprella (Hook. & Arn.) Champ.	s	H	D	
CELASTRACEAE				
Maytenus diversifolia (Maxim.) Ding Hou	s	H	E	
Maytenus emarginata (Willd.) Ding Hou	s	P	E	
BUXACEAE				
Buxus liukiuensis Makino	s	H	E	
Buxus microphylla Sieb. & Zucc. subsp. *sinica* (Rehd. & Wils.) Hatusima	s	H	E	
RHAMNACEAE				
Berchemia lineata (L.) DC.	wv	H	E	
Sageretia thea (Osbeck) Johnst.	ss	H	SD	
VITACEAE				
Vitis thunbergii Sieb. & Zucc. var. *taiwaniana* Lu	wv	H	D	
MALVACEAE				
Hibiscus syriacus L.	s	H	D	
Hibiscus tiliaceus L.	t	H	E	
THYMELAEACEAE				
Wikstroemia indica (L.) C.A. Mey.	s	H	D	
ELAEGNACEAE				
Elaeagnus formosana Nakai	ss	H	E	
Elaeagnus glabra Thunb.	ss	H	E	
Elaeagnus oldhamii Maxim	s	H	E	
FLACOURTIACEAE				
Scolopia oldhamii Hance	s	H	E	
LYTHRACEAE				
Lagerstroemia subcostata Koehne	t	H	D	rootstock
Pemphis acidula J.R. & G. Forst.	s	P	E	
MYRTACEAE				
Rhodomyrtus tomentosa (Ait.) Hassk.	s	H	E	
Syzygium buxifolium Hook. & Arn.	s	H	E	
Syzygium formosanum (Hayata) Mori	t	H	E	
Syzygium paucivenium (Robins.) Merr.	t	P	E	

Table 1. Continued.

Scientific name	Habit[a]	Geography[b]	Plant type[c]	Note
PLUMBAGINACEAE				
Limonium wrightii (Hance) Kuntze	ph	P	E	
SAPOTACEAE				
Planchonella obovata (R. Brown) Pierre	t	H	E	
EBENACEAE				
Diospyros ferrea (Willd.) Bakhuizen	s	P	E	
Diospyros philippensis (Desr.) Gurke	t	P	E	
Diospyros vaccinioides Lindl.	s	P	D	
SYMPLOCACEAE				
Symplocos chinensis (Lour.) Druce	s	H	D	
OLEACEAE				
Fraxinus griffithii C.B. Clarke	t	H	D	
Ligustrum liukiuense Koidz.	s	H	E	
ASCLEPIADACEAE				
Gymnema sylvestre (Retz.) Schultes	wv	H	E	
RUBIACEAE				
Gardenia jasminoides Ellis	s	H	E	
Gardenia jasminoides Ellis	s	H	E	
Morinda parvifolia Bartl.	wv	H	E	
Randia spinosa (Thunb.) Poir.	s	H	D	
Serissa japonica (Thunb.) Thunb.	s	H	E	
BORAGINACEAE				
Carmona retusa (Vahl) Masam.	s	P	E	
VERBENACEAE				
Callicarpa formosana Rolfe	t	H	E	
Callicarpa japonica Thunb. var. *luxurians* Rehd.	t	H	D	
Clerodendrum inerme (L.) Gaertn.	ss	H	E	
Premna hengchunensis S. Y. Lu & Yuen P. Yang	s	P	SD	
Premna serratifolia Linn.	t	H	SD	
Vitex negundo L.	t	H	D	
Vitex rotundifolia L. f.	cs	H	E	
CAPRIFOLIACEAE				
Lonicera japonica Thunb.	wv	H	E	
Viburnum odoratissimum Ker	t	H	E	
COMPOSITAE				
Crossostemphium chinense (L.) Makino	ph	H	E	

[a]Habit: t = tree, cs = creeping shrub, ss = scandent shrub, s = shrub, wv = woody vine, ph = perennial herb.
[b]Geography: H = Holarctic Kingdom, P = Paleotropical Kingdom, cv. = cultivar.
[c]Plant type: G = gymnosperm, D = deciduous, E = evergreen, SD = semi-deciduous.

Habit

There are 48 species trees (including 8 varieties and 2 cultivars), 34 species shrubs (including 1 subspecies and 5 varieties), 7 species scandent shrubs, 5 species creeping shrubs (including 1 variety), 7 species woody vines (including 1 variety), and 2 species perennial herbs.

Nageia nagi (竹柏), etc. 48 species belong to trees.

Eurya emarginata (凹葉柃木), etc. 34 species belong to shrubs.

Ficus tinctoria (山豬枷), *Rosa taiwanensis* (小金櫻), *Phyllanthus multiflorus* (多花油柑), *Sageretia thea* (雀梅藤), *Elaeagnus formosana* (台灣胡頹子), *Elaeagnus glabra* (藤胡頹子), and *Clerodendrum inerme* (苦林盤) belong to scandent shrubs.

Juniperus formosana var. *concolor* (綠刺柏), *Ficus pedunculosa* var. *mearnsii* (鵝鑾鼻蔓

榕), *Ficus pumila* var. *pumila* (薜荔), *Ficus vaccinioides* (越橘葉蔓榕) and *Vitex rotundifolia* (海埔姜) belong to creeping shrubs.

Limonium wrightii (烏芙蓉) and *Crossostemphium chinense* (蘄艾) belong to perennial herbs.

Geography

Seventy-nine species (including 1 subspecies and 10 varieties) belong to Holarctic Kingdom, 23 species (including 5 varieties) belong to Paleotropical Kingdom, and 2 cultivars belong to artificial taxa.

Nageia nagi (竹柏), etc. 79 species belong to Holarctic Kingdom.

Podocarpus costalis (蘭嶼羅漢松), etc. 23 species belong to Paleotropical Kingdom.

There are 2 cultivars – *Ulmus parvifolia* 'Rainbow' (斑葉榔榆) and *Ficus microcarpa* 'I-Non' (宜蘭榕) – which can't be classified.

Classification of bonsai

There are 8 species gymnosperms (including 2 varieties), 31 species deciduous plants (including 5 varieties and 1 cultivar), 2 species semi-deciduous plants, 61 species evergreen plants (including 1 subspecies, 5 varieties and 1 cultivar).

Nageia nagi (竹柏), *Podocarpus costalis* (蘭嶼羅漢松), *Podocarpus macrophyllus* var. macrophyllus (大葉羅漢松), *Podocarpus macrophyllus* var. *maki* (小葉羅漢松), *Pinus massoniana* (馬尾松), *Pinus morrisonicola* (台灣五葉松), *Pseudotsuga wilsoniana* (台灣黃杉), *Juniperus formosana* var. *concolor* (綠刺柏), etc. belong to gymnosperms.

Carpinus kawakamii (阿里山千金榆), etc. 31 species belong to deciduous plants.

Sageretia thea (雀梅藤), *Premna hengchunensis* (恆春臭黃荊), *Premna serratifolia* (臭娘子), etc. belong to semi-deciduous plants.

Quercus tarokoensis (太魯閣櫟), etc. 61 species belong to evergreen plants.

Note

Three native plants are used as rootstock for bonsai culture. For example, *Juniperus formosana* var. *concolor* (綠刺柏) for *Juniperus chinensis* var. *sargentii* (真柏), *Lagerstroemia subcostata* (九芎) for *Lagerstroemia indica* (紫薇), and *Prunus mume* var. *formosana* (台灣梅) for *Prunus mume* (梅).

CONCLUSION

Plant taxonomy and bonsai artists use different methods of plant classification. For bonsai, 'evergreen' means with leaves in a bonsai show. 'Deciduous' means no leaves in a bonsai show, including some evergreen plants of which the leaves are removed in a bonsai show, for example *Hibiscus tiliaceus* (黃槿).

It is difficult for the authors to identify plant names during a bonsai show. Because the leaves of the bonsai tree are very small, and can even be removed by hand. We must visit the bonsai gardens many times during different seasons for collecting many plant characters in order to identify their names.

Diversity of introduced bonsai plants in Taiwan

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Abstract

People introduced many plants such as fruits, vegetables, ornamental plants and other economical plants from other countries for some purpose in Taiwan during past time. After visiting the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung from 2013 to 2017, the authors recorded 121species (including 3 varieties) of introduced bonsai plants. These plants belong to 37 families and 80 genera in total (including 6 families, 9 genera, 12 species, and 2 varieties in gymnospermae; 31 families, 71 genera, 109 species, and 1 variety in angiospermae). By plant habit, most bonsai plants are tree or shrub type, but there are some special types, such as *Bougainvillea* and *Cryptostegia madagascariensis* that belong to scadent shrubs; *Wisteria floribunda* that belongs to woody vines; and *Jasminum sambac* that belongs to semi-vines. Most introduced bonsai plants are fruits and ornamental plants, some are other economical plants. People introduced *Juniperus chinensis* 'Itoigawa', *Juniperus chinensis* 'Kishu', *Cotoneaster horizontalis*, *Osteomeles subrotunda*, *Acer buergerianum*, and some cultivars of *Diospyros rhombifolia* from Japan for the purpose of bonsai art in recent time. *Diospyros rhombifolia* is native in Taiwan too, but is very rare and vulnerable. People don't collect this plant material from the mountain area in Taiwan.

Keywords: Taiwan, introduced bonsai plant, diversity

INTRODUCTION

People introduced many plants such as fruits, vegetables, ornamental plants and other economical plants from other countries for some purpose in Taiwan during past time.

METHOD

The authors visited the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung from 2013 to 2017.

RESULT AND DISCUSSION

The authors recorded 121species (including 3 varieties) of introduced bonsai plants, which belong to 37 families and 80 genera in total (including 6 families, 9 genera, 12 species, and 2 varieties in gymnospermae; 31 families, 71 genera, 109 species, and 1 variety in angiospermae) (Table1).

Table 1. Diversity of introduced plants used for bonsai in Taiwan.

Scientifical name	Habit[a]	Purpose of introduction[b]	Native[c]
GYMNOSPERMAE			
CYCADACEAE			
Cycas revoluta Thunb.	t	or	China
GINKGOACEAE			
Ginkgo biloba L.	t	or	China
PODOCARPACEAE			
Podocarpus cvs.	t	or	
Podocarpus costalis Presl cv.	t	or	
PINACEAE			
Keteleeria sp.	t	or	
Pinus thunbergii Parl.	t	or	Japan
Pinus thunbergii Parl. cv.	t	b	Japan
TAXODIACEAE			
Cryptomeria japonica (L. f.) D. Don	t	ec	Japan
Cunninghamia lanceolata (Lamb.) Hook.	t	ec	China
Taxodium distichum (L.) A. Rich.	t	or	America
CUPRESSACEAE			
Chamaecyparis	s	or	
Chamaecyparis	t	or	
Juniperus chinensis L. var. *sargentii*	cs	or	
Juniperus chinensis L. var. *kaizuka* Hort. ex Endl.	t	or	Japan
Juniperus chinensis L. var. *procumbens*	cs	or	Japan
Juniperus chinensis L. var. *sargentii*	cs	or	Japan
Juniperus chinensis L. var. *sargentii* 'Itoigawa'	cs	b	Japan
Juniperus chinensis var. *sargentii* 'Kishu'	cs	b	Japan
Juniperus rigida Sieb. & Zucc.	t	or	Japan
ANGIOSPERMAE			
CASUARINACEAE			
Casuarina equisetifolia	t	ec	Australia
MORACEAE			
Ficus religiosa L.	t	or	India
Morus atropurpurea Roxb.	t	fr	China
PHYTOLACCACEAE			
Rivinia humilis L.	ph	or	America
NYCTAGINACEAE			
Bougainvillea cvs.	ss	fl	America
PORTULACACEAE			
Portulacaria afra (L.) Jacq.	ph	or	Africa
MAGNOLIACEAE			
Magnolia liliflora Desr.	t	fl	China
Michelia alba DC.	t	fl	China
Michelia figo (Lour.) Spreng.	t	fl	China
OCHNACEAE			
Ochna atropurpurea DC.	s	fl	Africa
Ochna kirkii Oliver	s	fl	Africa
THEACEAE			
Camellia	t	fl	
Camellia chrysantha (Hu) Tuyama	t	fl	China
Camellia japonica L.	t	fl	China
Camellia oleifera Abel.	t	ec	China
Camellia sasanqua Thunb.	t	fl	China

Table 1. Continued.

Scientifical name	Habit[a]	Purpose of introduction[b]	Native[c]
ROSACEAE			
Chaenomeles lagenaria (Loisel.) Koidz.	s	fl	Japan
Chaenomeles sinensis (Thouin) Koehe	s	fl	Japan
Cotoneaster horizontalis Decne.	s	b	Japan
Malus	t	b	
Malus	t	b	Japan
Malus pumila Mill.	t	fr	Europe
Osteomeles subrotunda K. Koch	s	b	Japan
Prunus cvs.	t	fl	Japan
Prunus mume (Sieb.) Sieb & Zucc.	t	fr	China
Prunus persica Stokes	t	fr	China
Prunus salicina Lindl.	t	fr	China
Pyrus	t	fr	
Pyrus betuleafolia Bge.	t	fr	China
Pyrus lindleyi Rehder	t	fr	China
Pyrus serotina Rehder	t	fr	Japan
Rosa	ss	fl	
LEGUMINOSAE			
Bauhinia	t	fl	
Calliandra emarginata (Willd.) Benth.	s	fl	America
Haematoxylon campechianum L.	t	ec	America
Pithecellobium dulce (Roxb.) Benth.	t	or	America
Senna surattensis (Burm. f.) Irwin & Barneby	t	fl	India
Tamarindus indicus L.	t	fr	India
Wisteria floribunda (Willd.) DC.	wv	fl	Japan
EUPHORBIACEAE			
Blachia chunii	t	b	China
Euphorbia	ph	fl	
Euphorbia milii Desm.	ph	fl	Africa
Jatropha pandurifolia Andr.	s	fl	America
Sapium sebiferum (L.) Roxb.	t	ec	China
RUTACEAE			
X *Citrofortunella mitis* (Blanco) J. Ingram & H.E. Moore	t	fr	China
Citrus aurantifolia (Christm) Swingle	t	fr	Southeast Asia
Citrus x *aurantium* L. 'Chinotto'	t	fr	China
Citrus x *aurantium* L. 'Variegata'	t	fr	China
Citrus limon Burm.	t	fr	India
Citrus medica L.	t	fr	India
Citrus medica L. var. *sarcodactylis* Hort.	t	fr	China
Citrus x *nobilis* Lour. 'Kotokan'	t	fr	China
Citrus x *nobilis* Lour. 'Tankan'	t	fr	China
Citrus x *tangelo* J. Ingram & H. Moor. 'Miniola'	t	fr	
Fortunella hindsii (Champ.) Swingle	s	or	China
Triphasia trifolia P. Wilson	s	or	Malaysia
Zanthoxylum piperitum DC.	s	b	Japan
MALPIGHIACEAE			
Malpighia coccigera L.	s	fl	America
Malpighia glabra L. 'Fairchild'	s	or	America
Malpighia punicifolia	s	fr	America
ACERACEAE			
Acer	t	or	
Acer buergerianum Miq	t	or	Japan
SAPINDACEAE			
Dimocarpus longan Lour.	t	fr	China
Litchi chinensis Sonn.	t	fr	China

Table 1. Continued.

Scientifical name	Habit[a]	Purpose of introduction[b]	Native[c]
CELASTRACEAE			
Euonymus	s		Japan
Maytenus	s	or	Japan
BUXACEAE			
Buxus harlandii Hance	s	or	China
RHAMNACEAE			
Zizyphus mauritiana L.	t	fr	Arabia
TILIACEAE			
Grewia occidentalis L.	s	fl	Africa
MALVACEAE			
Hibiscus rosa-sinensis L.	s	fl	China
Malvaviscus arboreus (L.) Cav.	s	fl	America
Malvaviscus arboreus (L.) Cav. var. *drummondii* (Torr. & Gray) Schery	s	fl	America
STERCULIACEAE			
Sterculia nobilis R. Brown	t	fr	China
FLACOURTIACEAE			
Flacourtia inermis Roxb.	t	fr	Trop. Asia
TAMARICACEAE			
Tamarix juniperina Bunge	t	ec	China
LYTHRACEAE			
Lagerstroemia indica L.	s	fl	China
Lawsonia inermis L.	s	or	Australia
MYRTACEAE			
Callistemon citrinus (Curt.) Skeels	s	fl	Australia
Callistemon rigidus R. Brown	s	fl	Australia
Eugenia pitanga Kiaersk.	s	fr	America
Eugenia uniflora L.	s	fr	America
Melaleuca alternifolia Cheel	s	ec	Australia
Melaleuca leucadendra L.	t	or	Australia
Myrciaria cauliflora (C. Martius) O. Berg.	s	fr	America
Myrtus communis L.	s	fl	Mediterranean
Psidium spp.	s	fr	
Psidium	s	fr	
Psidium	s	fr	
Psidium catteianum Sabine	s	fr	America
Psidium cv. Odora	s	fr	
Psidium guajava L.	s	fr	America
Syzygium aqueum (Burm. f.) Merr.	s	fr	Malaysia
Syzygium polyanthum (Wight) Walpers	t	fl	India
Syzygium samarangense (Bl.) Merr. & Perry	t	fr	Malaysia
PUNICACEAE			
Punica granatum L.	s	fr	Mediterranean
ERICACEAE			
Rhododendron indicum (L.) sweet	s	fl	Japan
SAPOTACEAE			
Synsepalum dulcificum (A. DC.) Daniell	s	fr	Africa
EBENACEAE			
Diospyros	s		
Diospyros kaki Thunb.	t	fr	China
Diospyros rhombifolia Hemsl.	s	b	Japan
Diospyros rhombifolia Hemsl.	s	b	

Table 1. Continued.

Scientifical name	Habit[a]	Purpose of introduction[b]	Native[c]
OLEACEAE			
Jasminum mesnyi Hance	s	fl	China
Jasminum multiflorum (Burm. f.) Andr.	wv	fl	India
Jasminum sambac (L.) Ait.	s	fl	India
Osmanthus fragrans Lour.	s	fl	China
Olea europaea L.	s	fr	Mediterranean
APOCYNACEAE			
Adenium obesum (Forsk.) Balf. ex Roem. & Schult.	s	fl	Africa
Carissa congesta Wight	s	fl	Africa
Carissa macrocarpa (Eckion) A. DC.	s	fr	Africa
Plumeria rubra L.	s	fl	America
Trachelospermum asiaticum (Sieb. & Zucc.) Nakai	wv	b	Japan
Trachelospermum asiaticum (Sieb. & Zucc.) Nakai 'Natsu-yuki'	wv	or	
Wrightia religiosa	s	fl	Trop. Asia
ASCLEPIADACEAE			
Cryptostegia madagascariensis Boy.	wv	fl	Africa
RUBIACEAE			
Ixora	s	fl	
Ixora cv.	s	fl	
Ixora x *williamsii* Sandw.	s	fl	
VERBENACEAE			
Duranta repens L. 'Golden Leaves'	s	or	America
Holmskioldia sanguinea Retz.	s	fl	Himalaya
Lantana camara L.	s	ec	America
SCROPHULARIACEAE			
Leucophyllum frutescens (Berland.) I. M. Johnst.	s	fl	America
BIGNONIACEAE			
Parmentiera cerifera Seem.	s	fr	America
Tecoma jasminoides Lindl.	wv	fl	Africa
ACANTHACEAE			
Thunbergia erecta (Benth.) T. Anders.	s	fl	Africa
CAPRIFOLIACEAE			
Viburnum suspensum Lindl.	s	or	Japan

[a]Habit: t = tree, s = shrub, cs = creeping shrub, ph = perennial herb, ss = scandent shrub, wv = woody vine.
[b]Purpose of introduction: or = ornamental plant, b = bonsai art, ec = economical purpose, fr = fruit culture, fl = flower culture.

Habit

There are 63 species trees (including 2 varieties and 7 cultivars, with many cultivars in *Camellia* and *Prunus*), 48 species shrubs (including 1 variety and 1 cultivar), 2 species scandent shrubs (with many cultivars in *Bougainvillea*), 4 species creeping shrubs (including 2 varieties and 2 cultivars), 6 species woody vines (including 1 variety), and 4 species perennial herbs.

Cycas revolute (), etc. 63 species belong to trees.

Ochna atropurpurea (), etc. 48 species belong to shrubs.

Bougainvillea () and *Rosa* () cvs. belong to scandent shrubs.

Juniperus chinensis var. *procumbens* (), *J. chinensis* var. *sargentii* (), *J. chinensis* var. 'Itoigawa' () and 'Kishu' () belong to creeping shrubs.

Wisteria floribunda (), *Jasminum multiflorum* (), *Trachelospermum asiaticum* (), *Trachelospermum asiaticum* 'Natsu-yuki' (), *Cryptostegia*

madagascariensis ([illegible]) and *Tecoma jasminoides* ([illegible]) belong to woody vines.

Rivinia humilis ([illegible]), *Portulacaria afra* ([illegible]) and *Euphorbia milii* ([illegible]) belong to perennial herbs.

Purpose of introduction

There are 10 species (including 3 varieties) for bonsai art, 46 species (including 1 variety and many unknown cultivars) for flower culture, 42 species (including 1 variety and 5 cultivars, with many unknown cultivars) for fruit culture, 29 species (including 1 variety and 1 cultivar, with many unknown cultivars) for ornamental plants, 8 species for some economical purpose.

People introduced *Pinus thunbergii* cv. [illegible] *Juniperus chinensis* var. *sargentii* 'Itoigawa' ([illegible]), 'Kishu' ([illegible]), *Cotoneaster horizontalis* ([illegible]), *Osteomeles subrotunda* ([illegible]), *Blachia chunii* ([illegible]), *Zanthoxylum piperitum* ([illegible]), *Diospyros rhombifolia* ([illegible]) and *Trachelospermum asiaticum* ([illegible]) for bonsai creation.

People introduced *Bougainvillea* ([illegible]) cvs., etc. 46 species for flower culture.

People introduced *Cycas revoluta* ([illegible]), etc. 29 species as ornamental plants.

People introduced *Tamarindus indicus* ([illegible]), etc. 42 species for fruit culture.

People introduced *Cryptomeria japonica* ([illegible]), *Cunninghamia lanceolata* ([illegible]), *Casuarina equisetifolia* ([illegible]), *Camellia oleifera* ([illegible]), *Haematoxylon campechianum* ([illegible]), *Sapium sebiferum* ([illegible]), *Melaleuca alternifolia* ([illegible]) and *Lantana camara* ([illegible]) for different economical purposes.

Native

There are 22 species (including 1 variety and 2 cultivars) native in America, 12 species in Africa, 6 species in Australia, 1 species in Europe, and 3 species in the Mediterranean. In Asia, the authors analyzed some regions. There are 35 species (including 5 cultivars) native in China, 25 species in Japan, 8 species in India, 2 species in tropical Asia, 1 species in Southeast Asia, and 1 species in Himalaya region.

Note

Although *Diospyros rhombifolia* ([illegible]) is native in Taiwan, it is very endangered. Bonsai artists introduced it from Japan. In the other case, *Maytenus diversifolia* ([illegible]) is native in Taiwan too, but it is spiny. Bonsai artists introduced it from Okinawa for its no thorn character. *Cotoneaster horizontalis* ([illegible]) is native in Taiwan too, but it grows in high mountain areas. It is difficult to culture native plants in plain zone.

CONCLUSION

Although the *Juniperus chinensis* var. *sargentii* ([illegible]) is native in Japan, it grows very well and quickly in Taiwan. It became a famous bonsai plant soon. There are many *Juniperus* and *Chamaecyparis* species and cultivars in nurseries of Taiwan. Maybe they will become high potential bonsai plants.

On the other hand, there are many kinds of fruit cultivation in Taiwan. Some may become famous bonsai plants in the future.

Morphological diversity of crabapple in Taiwan: a potential plant species for bonsai

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Abstract

A bonsai is a plant that is grown in a little pot that is dotted with artificial hills and rocks, etc.

Crabapple (*Malus* spp.) is a landscaping tree well-known worldwide for its brilliant bloom and colorful fruits. Crabapples were introduced into Taiwan as the pollinizer and rootstock of apple trees cultivated in the highland regions during the 1950s. However, the introduced crabapple populations exhibited a large diversity of flowers, fruits, and leaves, thus resulting in confusion and/or difficulty for selection, utilization and taxonomy for horticultural purposes. The objective of this study was to establish a database based on morphological traits including leaf, flower (type and color), calyx retention, and fruit (setting, size, color, and persistence). We examined 36 plants from 10 unidentified crabapple accessions grown at the Fushoushan Farm, located in central Taiwan. Results showed that the crabapples have a lanceolate-ovate leaf shape and a serrate or diserrate leaf margin with erratic depth. The ventral side of the leaf is pilose or tomentose. All accessions are spur bearing. The inflorescence is umbellate, the perianth type is regular with five petals, and flowers are single. The color of unopened flower (balloon stage) ranges from dark red to light pink; petal color at anthesis is red, medium pink, or white. Fruit setting is medium to numerous. Mature fruit size ranges from 1.4 to 3.6 cm in diameter, and thus, accessions may be categorized into large (2.5-5 cm) and medium fruit (1.3-2.5 cm) groups. Fruit shape is globose, obloid, and ellipsoid. The calyx is sometimes present or always present. Peel color is yellow, light red or dark red, with or without red blush strips. The skin is glossy or slightly rough with a medium number of lenticels. Fruit persistence varies from short to very long. We suggested that crabapples have great potential as plant material for bonsai, particularly those with intensive flowers and fruits, brilliant color, and long persisting fruits without a calyx.

Keywords: crabapple, morphological trait, flower, fruit, leaf

INTRODUCTION

Crabapple (*Malus* spp.), a native plant of China, Europe and North America, produces fruit less than 2 inch (5 cm) in diameter and is a landscaping tree well-known for its illustrations of brilliant bloom and colorful fruits (Figure 1) (Fiala, 1994; Romer et al., 2003). Although three native crabapple species, i.e. *M. doumeri*, *M. hupehensis* and *M. koidzumii*, were identified by Huang et al. (2003) and Chang (2011), exotic commercial crabapples have been introduced into Taiwan as the main pollinizers and rootstocks of apple trees (*Malus domestica*) cultivated in the highland regions during the 1950s (Cheng et al., 1956), and thus, boosted the development of apple industry.

Figure 1. The inspired illustrations of brilliant bloom (A) and colorful fruits (B) of crabapple for landscaping garden.

Since the 1970s, apple production area in Taiwan was remarkably declined due to the drastic expansion of importing apple fruits; fortunately, the introduced crabapples were conserved and have been considered having the potential for ornamentals. However, the crabapple populations exhibited a large morphological diversity in flowers, fruits, and leaves, leading to confusion in selection, utilization and taxonomy for horticultural purposes.

This study aimed to establish a database based on morphological traits including leaf, flower type and color, fruit setting, fruit size and color, calyx retention, and fruit persistence for evaluating the potential of crabapple plants for bonsai.

MATERIALS AND METHODS

Thirty-six plants from 10 unidentified accessions (CR 11-12, CR 15-22) of crabapple grown at the "Fushoushan Farm" (Elev. 2100-2645 m, Lat. 24°14', Long. 121°14') (Figure 2), central Taiwan, were used in this study (Table 1).

Morphological traits of the leaf, flower, and fruit were examined and described in 2016 according to the Test Guidelines of Ornamental Apple and Apple Rootstock provided by UPOV (International Union for the Protection of New Varieties of Plants) in 2003 and 2015, respectively.

RESULTS AND DISCUSSION

All crabapples in Taiwan have a lanceolate-ovate leaf shape and a serrate or biserrate (CR 16 only) leaf margin with an erratic depth. The ventral side of the leaf is pilose or tomentose (Table 1), which may be useful for further taxonomical identification (Chang, 2011; Liu et al., 1994; Li et al., 2013).

Table 1. Morphological traits of 10 crabapple accessions examined in this study.

Accession no.	Leaf			Flower color			Fruit				
	Shape	Incisions of margin	Pubescence on lower side	Balloon stage	Bloom stage	Diameter (cm)	Shape	Color	Calyx retention	Setting	Persistence
CR 11	Lanceolate-ovate	Serrate	Pilose/ tomentose	Dark red	White	3.2-3.6	Obloid	Dark red	Sometimes present	Many	Very long
CR 12	Lanceolate-ovate	Serrate	Midrib with pilose/ tomentose	Dark red	Light pink	1.5-1.9	Obloid	Dark red	Sometimes present	Many	Very long
CR 15	Lanceolate-ovate	Serrate	Midrib with pilose/ tomentose	Dark red	Light pink	2.2-2.7	Globose	Dark red	Sometimes present	Many	Very long
CR 16	Lanceolate-ovate	Biserrate	Midrib with pilose/ tomentose	Dark red	Medium pink	2.6-3.5	Globose-obloid	Light red with blush strips	Always present	Many	Very long
CR 17	Lanceolate-ovate	Serrate	Pilose/ tomentose	Dark red	Medium pink	2.2-2.6	Obloid	Yellow	Sometimes present	Many	Very long
CR 18	Lanceolate-ovate	Serrate	Pilose/ tomentose	White	White	1.4-1.8	Globose-obloid	Light red	Sometimes present	Many	Very long
CR 19	Lanceolate-ovate	Serrate	Pilose/ tomentose	Medium red	White	2.0-2.3	Ellipsoid	Yellow	Always present	Many	Very long
CR 20	Lanceolate-ovate	Serrate	Pilose/ tomentose	Dark red	Medium pink	2.0-2.2	Globose	Yellow	Always present	Many	Very long
CR 21	Lanceolate-ovate	Serrate	Pilose/ tomentose	Dark red	White	3.2-3.4	Globose	Yellow with blush strips	Always present	Medium	Medium
CR 22	Lanceolate-ovate	Serrate	Pilose/ tomentose	Medium red	Light pink	1.5-2.5	Ellipsoid	Dark red	Sometimes present	Many	Very long

All the measurements were made according to the Test Guidelines of Ornamental Apple and Apple Rootstock provided by UPOV in 2003 and 2015, respectively.

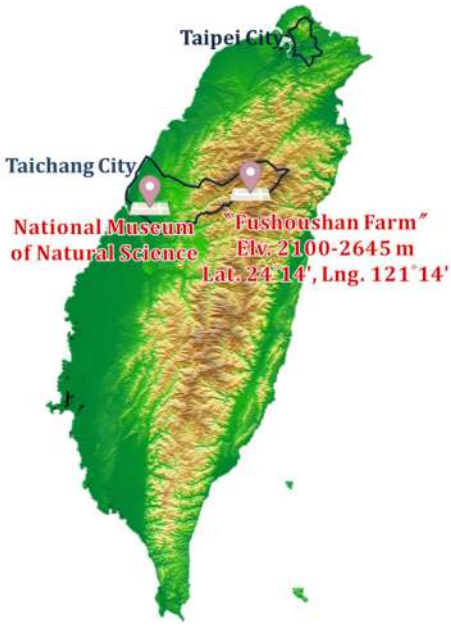

Figure 2. The location of "Fushoushan Farm" in Taiwan.

All accessions are spur bearing (Figure 1). The inflorescence is umbellate, the perianth type is regular with five petals, and the flowers are single (Figure 3). The color of unopened flower ranges from white (CR 18), dark red (CR 11, CR 12, CR 15-17, CR 20-21) to medium red (CR 19, CR 22); petal color at anthesis is light pink (CR 12, CR 15, CR 22), medium pink (CR 16, CR 17, CR 20), or white (CR 11, CR 18, CR 19, CR 21) (Table 1), which exhibited impressive bloom like those cultivated in Europe (Fiala, 1994) and in China (Li et al., 2013).

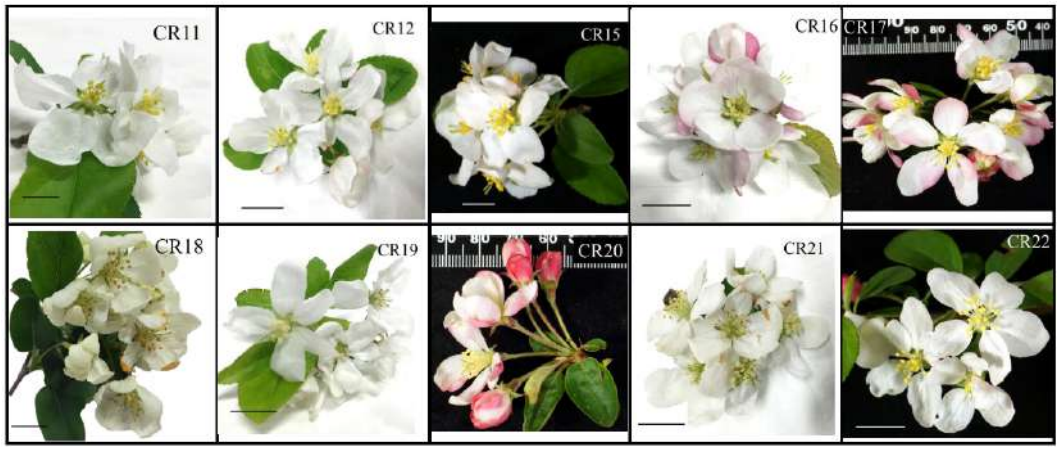

Figure 3. Photos of blooming states and colors of 10 unidentified crabapple accessions examined in this study (scale = 1 cm).

Fruit setting is usually numerous, rarely medium (CR 21 only) and fruit persistence varies from medium (CR 21 only) to very long (Table 1), indicating that fruiting is easy and fruit hanging is extended in crabapples, which might be beneficial material for bonsai use.

Mature fruit size ranges from 1.4 to 3.6 cm in diameter (Table 1) and may be categorized into large (2.5-5 cm; CR 11, CR 16, CR 21) and medium fruit (1.3-2.5 cm; CR 12, CR 15, CR 17-20, CR 20, CR 22) groups in accordance with Fiala's classification (1994), which may appeal to multiple favor of bonsai audience.

Fruit shape is globose, obloid or ellipsoid. The calyx is sometimes present (with different frequency, data not shown) (CR 11, CR 12, CR 15, CR 17, CR 18 and CR 22) or always present (CR 16, CR19-21) (Table 1; Figure 1). The fewer or lower frequency of calyx retained in mature fruit seems to be more attractive for the bonsai due to its glossier calyx end. Peel color is yellow (CR 17, CR 19, CR 20, CR 21), light red (CR 16, CR 18) or dark red (CR 11, CR 12, CR 15, CR 22), with (CR 16 and CR 21) or without red blush strips (Table 1; Figure 4). The sparkling of peel color seems to be the most inspired trait for bonsai.

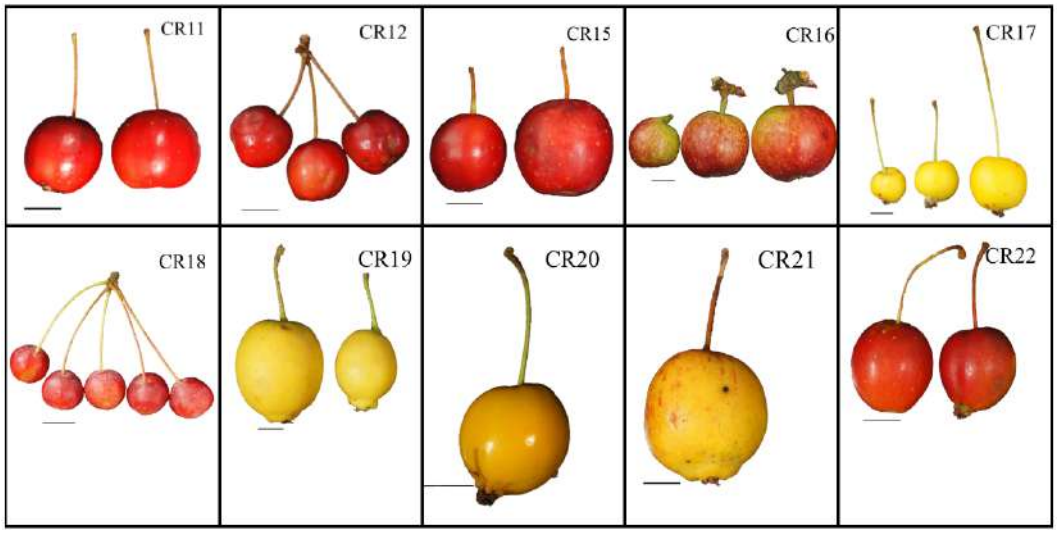

Figure 4. Photos of fruit shapes and peel colors of 10 unidentified crabapple accessions examined in this study (scale = 1 cm).

Crabapples in Taiwan displayed a diversity of fruit color, size and persistence which was analogous to that reported by Romer et al. (2003), except that the skin is glossy or slightly rough with a medium number of lenticels. Moreover, undoubtedly, crabapples should be suitable for bonsai due to their intensive bloom and colorful mini fruits.

CONCLUSION

A preliminary database based on morphological traits of crabapples in Taiwan has been established. Crabapples, particularly those that flower and fruit intensively and display brilliantly colored long persisting fruits with fewer or lower frequency of calyx retention at maturation, i.e., CR 11, CR12, CR 15 and CR 17, have great potential for bonsai. However, additional research is required into their systematic taxonomy to clarify 10 unidentified accessions and apply the appropriate selection, propagation, and management techniques.

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The stronger the youth, the better the future of penjing: analysis of penjing education for youth and prospects of penjing industry in China

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Analysis of the Young Talents Cultivation and the Future Development of Penjing Industry, China
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Abstract

Penjing, originated in China, has a history of thousands of years. It has been inherited as "three-dimensional painting and silent poetry" with the reputation of living art. In modern times, penjing artists are primarily middle-aged and elderly people, so penjing art has been regarded as sunset industry. Compared with the seniors' life attitude of moderation, self-seclusion and conformism, in the unique philosophy of the current young generation, they more favor to realize their own value and pursue their own dreams. With the development of young people's nostalgia for the traditional art so far, penjing, as the essence of Chinese culture and art, begins to influence more and more young people's lives. More and more far-sighted seniors began to devote themselves to the cultivation of young talents in penjing, and show the new situation and positive energy of Chinese penjing industry.

According to 'The Prospects of Chinese Penjing Industry Market and Investment Strategy Planning Analysis Report from 2016 to 2021', a region-directed comprehensive research, it can be seen that from the 21st century, the world spent about 10 billion US dollars on special flowers annually, and the market prospect of special flower is promising, which includes penjing industry. No industry and trade can develop without sustainability. When youth enter the field, the fresh blood and vitality began to exert their influence, thus giving the industry creativity and vitality.

Keywords: youth, education, penjing, industry

INTRODUCTION

Penjing, originated in China, has a history of thousands of years. It has been inherited as "three-dimensional painting and silent poetry" with the reputation of living art. Japanese described penjing as "grandfather's hobby". In Chinese history, penjing was always used as decoration for the houses of the high position officials and lords with social status. In modern times, penjing artists are primarily middle-aged and elderly people, so penjing art has been regarded as sunset industry. Influenced by the development of high-tech, efficiency turns to be priority in everything. When everyone is accustomed to the fast life and various fast food, people begin to remind the "slow life" and advocate returning to nature. In the unique philosophy of the current young generation, they more favor to realize their own value and pursue their own dreams. With the development of young people's nostalgia for the traditional art so far, penjing, as the essence of Chinese culture and art, begins to go into more and more young people's lives. "Innovation is the soul of a nation", there is no development without innovation. It is necessary to bring in new blood for the sake of innovation in tradition.

With the development of economy and comprehensive national strength, Chinese people's demands for the spiritual culture are constantly rising. Penjing has gradually returned, it goes into normal people's lives, which has been noticed by penjing artists. More and more far-sighted seniors begin to devote themselves to the cultivation of young talents in penjing, and show the new situation and positive energy of Chinese penjing industry.

PENJING EDUCATION FOR YOUTH

Penjing education of pupils

Guangdong, as the hometown of Lingnan Penjing and also a big province of Chinese traditional penjing, is top in quality, scale and popularity. Guangdong people's passion for penjing not only reflects from they owe plenty of professional penjing trees and the large scale of exhibitions, but also in their instilling penjing concept to the next generation, which is the most praiseworthy. From national statistical data in 2016, Guangdong has a population of 108 million, which is the most populated province of China, and the youth ratio is also the highest all over the country.

Thousands of years Guangdong penjing is mainly grown by adults and communicated among professional family, from where the kids learn, so penjing can succeed by family mode. It is good for local professional penjing family to succeed but not so good for promotion. In the 21st century, Guangdong people started to change the situation. A penjing education base was dedicatedly set up in Guangdong Primary School. Under the active promotion, penjing was drawn in the art class, learnt in science class and written in the composition of Chinese class. In Guangzhou International Bonsai Exhibition (held by BCI) and Panyu National Penjing Exhibition, hundreds of pupils were organized to paint penjing, which not only cultivated the children's perception, awareness and understanding of penjing from childhood, but also laid a certain aesthetic and artistic foundation. The concept of penjing heritage is implemented unconsciously.

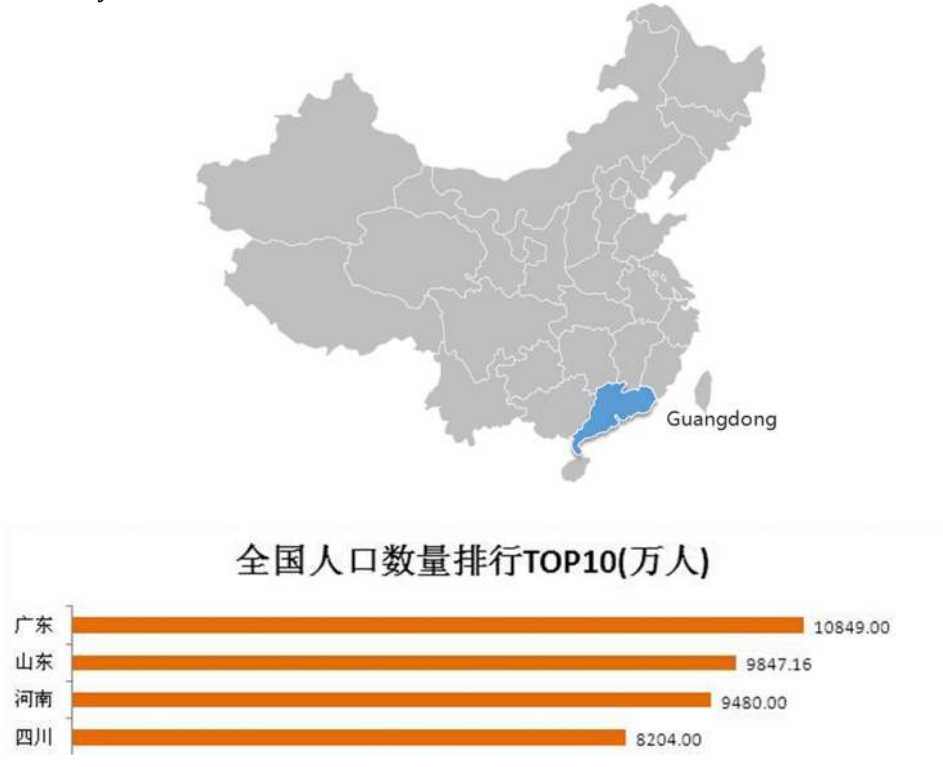


Figure 1. Population top 4 provinces in China.

Figure 2. Pupils learn to paint or make penjing.

Penjing education of middle school students

The second biggest population province, Shandong, also contributes its effort on education for youth. The national census data in 2015 showed teenagers (18-35 years old) occupying about 27% of total population of 98.5 million. If penjing class can be implemented in school, this means at least 27 million young people will store the knowledge of penjing.

Use the "Dragon's Heart" school as example, the students here are about 12 to 15 years old, a penjing interest team was set up from 2016, more than 300 students entered. At the beginning of 2017, the team was expanded and divided into different subgroups, with 28 persons in Grade 7 team, 31 persons in Grade 8 team and 46 persons in Grade 9 team, so students can learn by their own procedures. The content of the course included the relationship between Chinese traditional culture and penjing, development and current situation, etc. For enhancing their operating ability, during the summer vacation they were asked to take their own penjing back home to keep. This greatly improved the students' hands-on operation, raising ability and also cultivated the younger generation's interest in penjing. In this way, youth in penjing area in Shandong keep's on increasing and Shandong penjing college was established in May this year, which is the reflection of young people's passion for penjing.

Figure 3. Middle school students in Zaozhuang, Shandong Province, are having penjing class and conducting hands-on practice.

Penjing education of young adults

Not only children and teenagers, but also young adults show a strong interest in penjing. From 2012, professional penjing training class started in Bengbu city, Auhui province. For five successive years, the statistics show students came from all corners of the country with young people (below 45 years old) as the majority, which made a significant contribution to the follow-up development of penjing industry.

Figure 4. Penjing teaching to young generation by video by Anhui Penjing Association.

As the hometown of the flowers of China and the largest flower planting base in Jiangsu Province, Shuyang city is also penjing training base. There are 22 Taobao villages of flowers and penjing network dealers, where Taobao Village Summit Forum was held here in 2016. The focus of the whole industry shifted to the youth-thinking oriented business model, which was not only characteristic of the time, but also the development trend of penjing. Since the first public welfare training course in 2015, more than 1,000 young students have been trained free of charge. When more of the young generation will select penjing as their career, this will help Chinese penjing develop stably.

Figure 5. Opening ceremony of the welfare penjing training course in Shuyang by Zhong Pen Hui (China Bonsai Association).

Figure 6. Lectures to the students by China Penjing Association.

SHANGHAI INTERNATIONAL YOUTH FORUM OF BONSAI

Shanghai is the birthplace of Shanghai school penjing; four national penjing masters were born here. Shanghai International Youth Forum of Bonsai was held in Shanghai Botanical Garden in April, which was co-sponsored by the professional institutions from several countries and regions such as China Penjing Association, American Bonsai Society, German Bonsai Association, French Bonsai Association, Korean Bonsai Cooperative, National Bonsai Association of Taiwan (NBAT), and so on. This is also the world's first pengjing convention with "Youth" as the theme. Through organizing forums, we call on the young people with technology, enthusiasm and influence to come to Shanghai to communicate and interact with each other and integrate high-quality resources, so as to let the international pengjing industry understand the aesthetics of Chinese penjing culture.

The foreign guests attending the forum were from more than ten countries and regions. The current and Ex Chairmen of World Bonsai Friendship Federation (WBFF), and Bonsai Clubs International (BCI) were present. Besides, 20 domestic outstanding young talents became the leading roles of the feast. According to the early recruitment requirements of the forum, all young people participating in the activity were under the age of 45, representing the backbone of the contemporary Chinese penjing industry. Some of them were young but had been long known in the industry; some were not yet skilled, but the personal styles were outstanding. The performances pushed the forum atmosphere to a climax and obtained the high attention of domestic and overseas professional media as well as the national public media. It was widely believed that this activity recognized the cultivation of young people and positive impact in future. The second exhibition of the forum was the after-school works of the students from a Shanghai local vocational and technical school. Although a gap existed between the immature style rockery penjing and the mature scenery works in the first exhibition, this was just the target that Shanghai International Youth Forum of Bonsai had expected to achieve: everyone can do penjing; the young generation should be cultivated from now.

Figure 7. Professor Amy Liang, International Pengjing Master, Ex-President of National Bonsai Association of Taiwan and Penjing Professor, put forward expectations for young people.

PROSPECTS OF CHINESE PENJING

The current Chinese penjing develops in full swing. According to "The Prospects of Chinese Penjing Industry Market and Investment Strategy Planning Analysis Report from 2016 to 2021", a region-directed comprehensive research, it can be seen that from the 21st century, the world spent about 10 billion US dollars on special flowers annually, and the market prospect of special flowers is promising, which includes the penjing industry primarily based on modeling. No industry and trade can develop without sustainability. When young men enter the field, the fresh blood and vitality began to exert their influence, thus giving the industry creativity and vitality.

Figure 8. The Prospects of Chinese Penjing Industry Market and Investment Strategy Planning Analysis Report from 2016 to 2021.

PLANTING SCALE OF PENJING

According to the 'CN Flower Association Bonsai industry report', planting scale of penjing is very stable. In 2016 there were 18,437.70 hectares all over the country. Compared with 17,823.61 hectares in 2015, this was an increase of 614.09 hectares (3.45%). Compared with 19,788.36 hectares in 2014, this was a decrease of 1,350.66 hectares (6.83%). In 2016, the largest scale of penjing planting was 3,496.12 hectares in Guangdong province, and the next was Sichuan province with 2,267.00 hectares. In 2016, the largest increase in planting area of penjing compared to 2015 was 611.27 hectares in Guangxi Zhuang Autonomous Region. The next was Shandong province with 196.90 hectares.

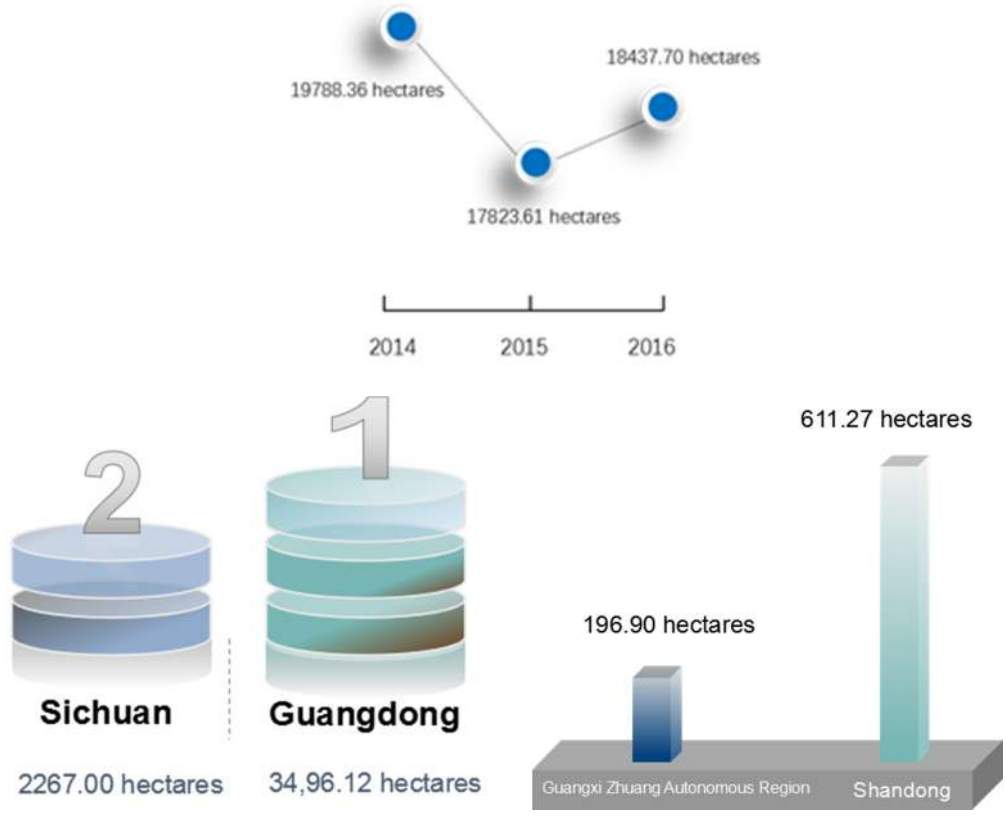


Figure 9. Planting scale of penjing and the increase in planting area of penjing.

QUANTITY OF PENJING SELLING

The quantity of penjing selling in 2016 was 45.287 million pcs in Fujian province, the second was Guangdong province with 35.6817 million pcs. In 2016, the highest increase in sales of penjing compared to 2015 was 10.9060 million pcs in Jiangsu province, followed by 1.2000 million pcs in Hubei province.

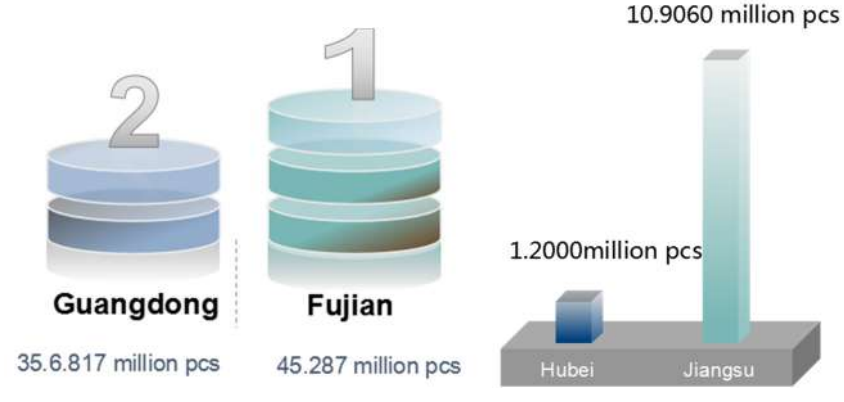


Figure 10. The quantity of penjing selling and the increase in sales of penjing.

SALES OF PENJING SELLING

Total sales of penjing is increasing year by year. The largest sales of penjing in 2016 was 1.0599669 billion RMB in Guangdong province, the second was Fujian province with 620.186 million RMB. The biggest increase in sales in 2016 was 300 million RMB in Shaanxi province, the second was Hubei province with 143.63 million RMB.

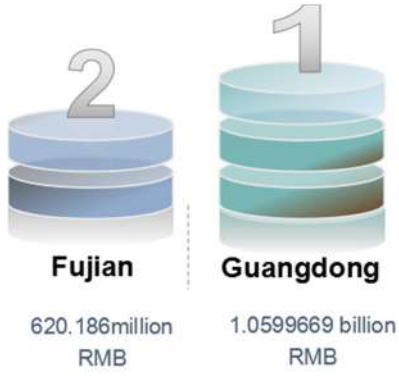
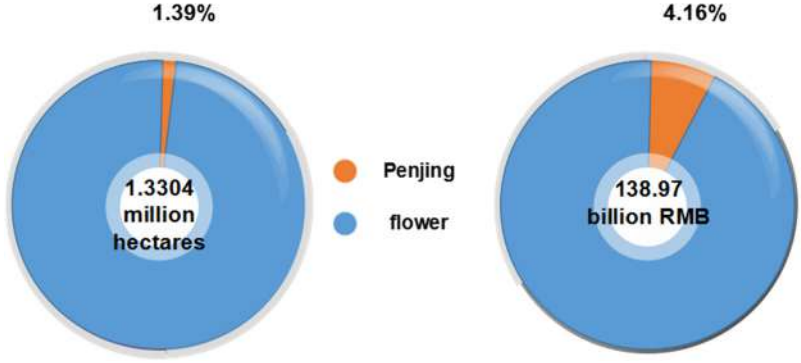


Figure 11. Sales of penjing selling.

PENJING ECONOMY IN CHINA

In 2016, 18,437.70 hectares of penjing were planted in China, which accounted for 1.39% of the total area of the total flowers of 1.3304 million hectares. That year's penjing sales was 5.7773965 billion RMB. It accounted for 4.16% of the total sales of flowers at 138.97 billion RMB.



CONCLUSION

It is expected penjing industry will develop fast and stably in China in the next decade. There are four typical regions in which penjing industry development performs as follows:

Jiangsu province has a long history of penjing, which contributes big effort to exchanges and cooperation to expand penjing market. Since the 1980s Jiangsu exported penjing to the United States, Britain, France, Germany, Japan, Singapore and other countries and regions, and won reputation. According to the statistics, in the early 1980s, there were less than 100,000 pcs penjing in Jiangsu province. In 2014, the sales volume reached 562.6 million pcs, with sales exceeding 1 billion RMB. There are over 100 penjing enterprises and units in the province, nearly 10,000 people are employed, 20 of them have more than ten thousand pcs of penjing.

Sichuan penjing is renowned both home and abroad, penjing market demand is increasing rapidly and the industry grew. Pixian, Wenjiang river, Dujiangyan and other places are the birthplace of Sichuan penjing and the main production area. At present, Pixian penjing production area is about 6,000 acre. There are about 5,000 people in penjing industry.

Guangdong penjing, also known as the Lingnan penjing, is one of the traditional five schools. Shunde is one of the first batch of penjing cities in China, the production of penjing is mainly in the surrounding area of cheng cun flower world. The planting area of the surrounding penjing is about 80,000 acre, the park has 5,000 acre, the planting area of the penjing near the park is about 3,000 acre. Penjing are exported to more than 20 countries including the United States and the Netherlands and so on. Guangdong Weiguang Penjing Garden center with more than 300 acre of penjing production base, with a yearly production of nearly 2 million pcs, is one of the largest bases of penjing export in China.

Zhejiang penjing development benefited from the deep local penjing culture, planting area of penjing was 1,397.2 hectares in 2015, and the sales volume reached 5.97 million pcs, with sales to 367.39 million RMB.

New practices of bonsai – from ideas to works

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Abstract

A bonsai is a plant that is grown in a little pot that is dotted with artificial hills and rocks, etc. As a scaled-down version of the real world, it reveals the artistic conception of nature and changes in the four seasons. A bonsai is made up of three elements, i.e. tree, pot, and frame, and the process of making a bonsai (selection of a tree -> selection of the front and design of the tree's shape -> production -> work) is in line with the definition and practice of the bonsai industry for more than 1,000 years. This paper rethinks bonsai artistic creation with the tree as the main material. In addition to the natural epitome, how to create a piece of work that integrates personal concepts, ideas and the spirit of the time? After action research, this paper puts forward a new view of bonsai aesthetics and summarizes a new creation process (concept -> imagination -> conception -> production -> work) so as to enable bonsai creators to follow new scientific principles and processes and provide a reference for the bonsai industry.

Keywords: bonsai, penjing, art

INTRODUCTION

Lacking of a rigorous academic theoretical basis, today's bonsai industry only conducts discussion from a number of technical aspects, thus rendering largely identical models. Yang (2010) pointed out that for a long period, bonsai creators and related practitioners tended to pay more attention to technical practice, and there was a lack of studies on systematic theory, making rare improvement in artistic standards. Continuous expansion and accumulation of industrialized and commercialized works have failed to engage bonsai creation in a "creative" art field. A large majority of works are imitations of old works and are short of creativity. The main reason for such phenomena lies in same "method" of bonsai. When there is a new method produced, bonsai will have a new style.

This paper first discusses, summarizes and analyzes methods of bonsai through relevant literature, and then sums up a new set of bonsai methods for the bonsai industry as a reference.

LITERATURE REVIEW

The world's earliest bonsai record dates back to a fresco painting of three maids holding pieces of bonsais found in the tomb of Prince Zhanghuai in China. Maid A held "a lotus-shaped bonsai that was dotted with artificial hills and trees" (Figure 1), Maid B held "a bonsai with small stones and trees, green leaves red fruits" (Figure 2) and Maid C's bonsai peeled off in its paint and painting. As time may be inferred from the bonsai, the tomb of Prince Zhanghuai was built in 706 (Committee of Relics Collection and Compilation, 1972). From the posture of the maids holding the bonsai, it can be inferred that the royal court attached great importance to the art of penjing. The fresco was a true portrayal of court life at that time, proving that bonsai appeared in China 1200 years ago.

Figure 1. Holding a lotus-shaped bonsai. Source: Liang (1997).

Figure 2. Bonsais with small stones and trees, green leaves red fruits. Source: Liang (1997).

Indeed, bonsai originated in China. However, it was spread to Europe and America by Japan. At present, most well-known bonsai masters in America are students of Japanese bonsai masters Yuji Yosimura and John Yoshio Naka (Ho, 2004). "Potting" is explained in Dai Kan-Wa Jiten as: "Plants in pots for ornamental purpose", which is not inclusive. The Japan Bonsai Association is the most authoritative association in the bonsai industry in Japan. It published The Master's Book of Bonsai co-authored by three directors of the association in 1967. The authors of this book, as experts in the identity, held the opinion that "a bonsai is a tree grown in a container. In spite of its small size, it presents elegance and a spectacular of trees growing in a natural environment. Hence, Japanese bonsai refers only to tree Penjing in China's Penjing." The book also pointed out the difference between potted plants and bonsai, with the former focusing on ornamental flowers and leaves, and the latter paying attention to overall beauty and harmony with the vessels. In fact, in appreciation of the Chinese art of penjing, there is a principle of "first tree, then pots and last frames," indicating that trees and vessels are not the only subjects (Ho, 2004). Thus, "bonsai" and "penjing" are the same in the international bonsai industry.

The British and Japan Exhibition in 1910 witnessed bonsais provided by the bonsai industry in Japan, while at the Tokyo Olympic Games in 1964, a bonsai show was held in Bigu Garden in Japan. During the Osaka World Expo in 1970, bonsais were displayed in a beautiful Japanese-style garden, thus causing a modern bonsai upsurge (Liang, 1997).

PRODUCTION PROCESS OF A BONSAI NOWADAYS

Using woody plants as the main material, bonsai adopts multiple techniques including banding, pruning, grafting, carving, and horticulture cultivation to display natural scenes of trees. Bonsais feature wild giant trees, peculiar mountain trees and various types of jungle scenery. As living plants, trees present varied scene and changes between seasons and ages (Zhao, 1995). Currently, each step of bonsai production (selection of a tree -> selection of the front and design of the tree's shape -> production -> work) has its focus as shown in Figure 3. Bonsai aims to display the beauty of trunks and branches and show the wonders of nature in the work. It is people's desire for nature that allows them to understand the importance of nature, their love for mountains and water, and green pines once they are far away from nature (Chang, 1998).

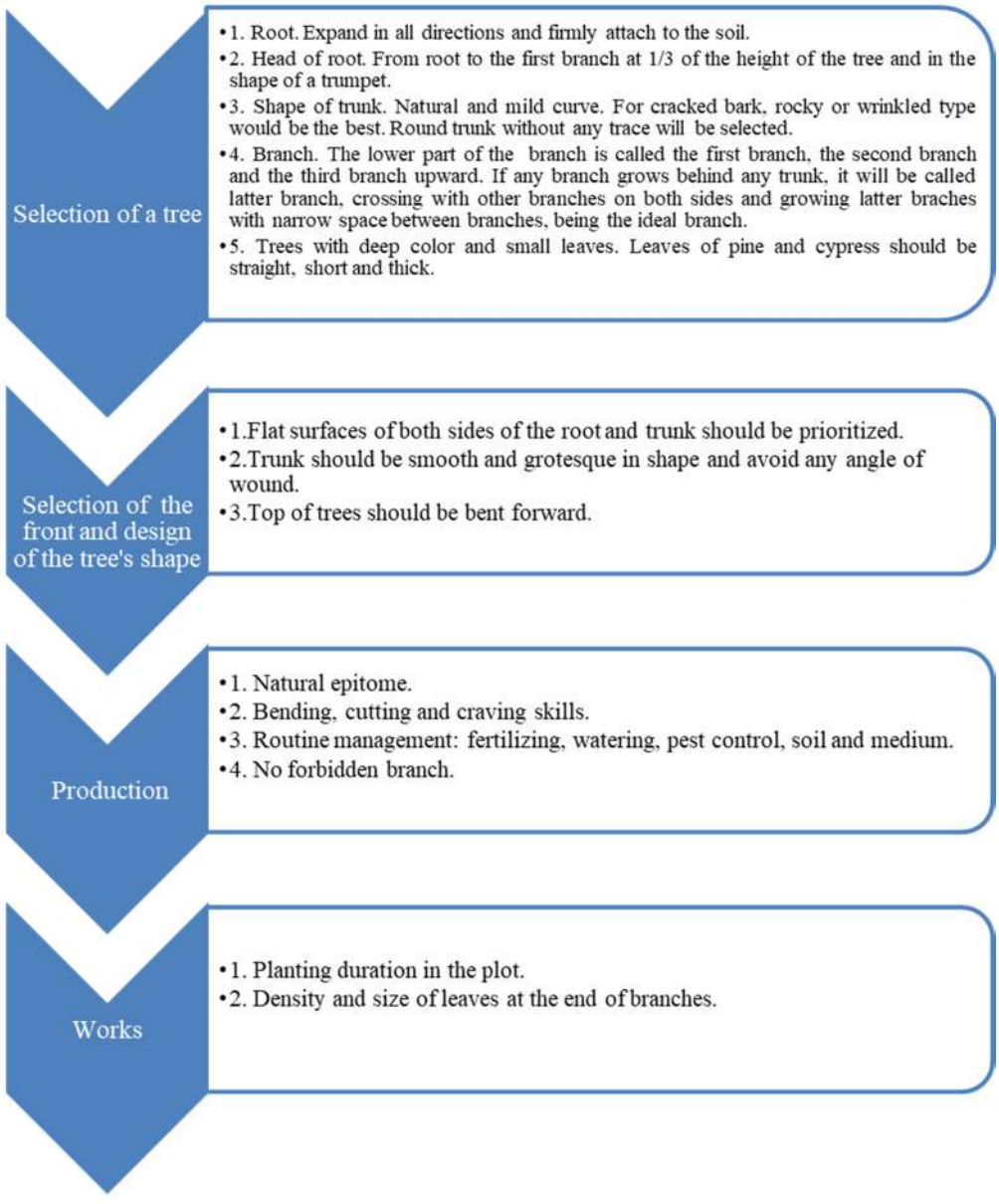

Figure 3. Production process of a bonsai at current stage. Source: Yang (2013).

The shapes of the trees in the bonsai industry are affected by the production process, and they tend to be modeled without any change. A friend from the art circle, after visiting a banyan show, stated, “They are like copies of a model, resembling each other in all aspects”, pointing out the problems and difficulties that plague the whole bonsai industry and should be addressed jointly by creators. The champions of the first to the eighth Chinese Banyan Show are shown in Figure 4, which clearly mirrors the problem of similar trees without any change and failure to display characteristics of banyan trees (Yang, 2010). It is also true for other trees.

Figure 4. Champions from the 1st to 8th show. Source: Yang (2010).

NEW CREATION PROCESS OF A BONSAI

A bonsai refers to a plant grown in a container, dotted with artificial hills and rocks. As a scaled-down version of the real world, it reveals an artistic conception of nature and the changes of the four seasons. A bonsai is made up of three interacting elements, i.e. tree, pot, and frame. "Three-dimensional painting" and "silent poetry" – this has been the definition and description of the bonsai industry for more than 1,000 years. Can bonsai become a well-known and well-recognized art like ink painting, sculpture and other art? If trees are used as a material for art creation, how can creators express their personal feelings and ideas through bonsai creation?

The author, through actual bonsai creation, aims to build a new set of bonsai creation methods and techniques and proposes suggestions for new ideas during the process so as to enable bonsai creators to follow new scientific principles and provide a reference for the bonsai industry.

NEW IDEAS OF BONSAI – BONSAI AS MIXED MEDIA

Bonsai now use a variety of materials including vessels, trees, stones, cement, tiles, small dolls, and so on. In terms of the current classification of art, bonsai belongs to the mixed media in visual arts. The so-called "mixed" means to combine any two (or more) different media together and present a certain type of art. In the first paste-up made by Pablo Picasso, paint was used to draw pipe, glass and lemon, and newspaper and napkin were pasted, together with letters of "JOU". Then, manila rope was employed to round it into an oval around the canvas (Figure 5). As a new form of artistic expression, mixed media provides more possibility of free artistic creation. Today, mixed media art is still an important technique for artistic creation used to convey ideas and concepts.

Figure 5. Inanimate object on the cane chair. Source: Chang (2016).

USE OF FORBIDDEN BRANCHES

To make the whole bonsai look better and harmonious, some branches should be cut, which, in the bonsai industry, are called "forbidden branches" (Figure 6). However, from a new perspective, the author regards forbidden branches as the first step of bonsai creation. The author divided tree branches into smooth branches and forbidden branches. To ensure a beautiful bonsai, smooth branches should be kept and forbidden ones cut. In the process of learning bonsai, the author spared no efforts in repeating the above process in a bid to win awards in competitions and later found that all works were of great similarity. Through detailed observations of nature, the author found that it was wrong to cut all the forbidden branches and leave only the smooth branches. Laozi said in Tao Te Ching, "The Tao produced One; One produced Two; Two produced Three; Three produced all things. All things leave behind them the Obscurity (out of which they have come), and go forward to embrace the Brightness (into which they have emerged), while they are harmonized by the Breath of Vacancy." To illustrate this sentence using the growth of trees: when trees begin to grow, their branches can be divided into smooth branches and forbidden branches, crossing with each other to form a changeful shape. The shapes of the trees are produced under such state. From different perspectives, the roles of smooth and forbidden branches may shift. Changes in smooth and forbidden branches give rise to infinite shape changes. Thus, trees are by no means perfect only with smooth branches or forbidden branches as their shape may be hindered. With harmonious integration of smooth branches and forbidden branches, trees may display their beauty with their changing shapes. It is possible to find multiple trees that are more than one hundred years old and conduct observations to understand the relationship between smooth branches and forbidden branches (Figure 7) and the mystery of tree shapes.

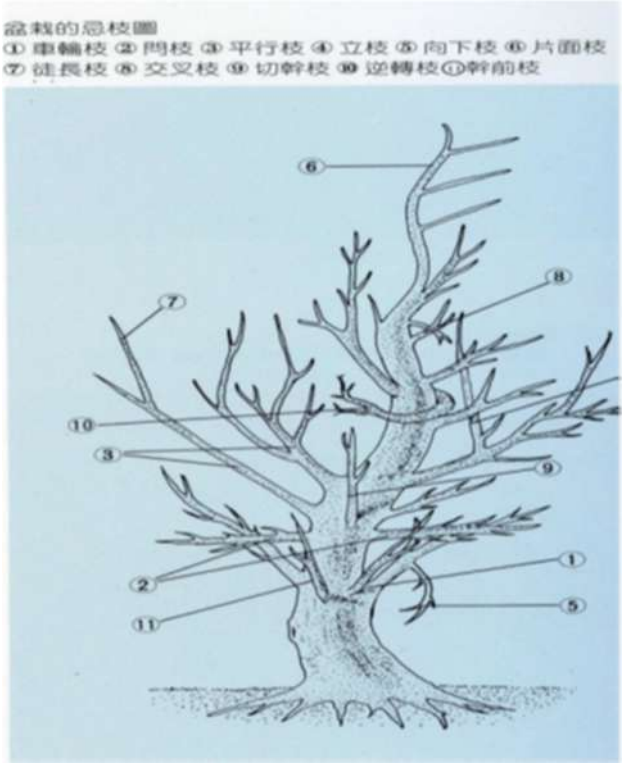

Figure 6. Forbidden branches. Source: Liang (1997).

Figure 7. Black pine in nature. Source: Yang Hsiu.

MANIFESTATION OF CHARACTERISTICS OF TREES

Trees are the general term for woody plants, including arbors, shrubs and woody vines. Different trees are characterized by their own shapes, structures, ecology, and distribution. Han Baode, the famous aestheticist, deemed that nature is inseparable from common sense, pureness and naturalness, while natural beauty is a natural trait presented during creation. Showing the nature of things is showing the natural beauty. Hence, the failure to display characteristics of trees and focus merely on shapes will render a series of similar bonsai works, as shown in Figures 7-9. Readers may refer to the bonsai works in the world bonsai industry.

Figure 8. *Juniperus chinensis*. Source: Yang Hsiu.

The essence of trees is different, and each author has varied feelings of the same species. For example, banyan are evergreen trees with a great deal of hanging aerial roots on their trunks like a pillar inserting into the soil, green oval whole keratin leaves, with a length of 4 - 8 cm, and wedge-based and pinnate veins. Their nearly flat spherical syconus are born in leaf axils with a diameter of 8 mm. The aerial root of banyan is a prominent feature as shown in

Figure 10. How to make good use of aerial root as a mainline of creation? It is worthy of consideration for bonsai creators.

Figure 9. Black pine. Source: Yang Hsiu.

Figure 10. Banyan in nature. Source: Yang Hsiu.

NEW CREATION PROCESS

The famous contemporary art philosopher and art critic, Arthur C. Danto (2010), argues that we should no longer merely follow our predecessors' methods (forms) and our work should be of great personality and mirror the era we are at. "If we wish to convey messages beyond time, we must find our own way and the most appropriate expression for our time." In addition to the current practice (Figure 3), a new bonsai process was built after summing up the author's creation, making bonsai an art to express concepts and ideas of the creators rather than just a mere natural epitome. From concepts to the process of creating the work, this order (concept -> imagination -> conception -> production -> work) can be reversed freely. For example, if a creator's works do not match the theme during the production process, it is possible to return to the imagination part.

EMPIRICAL EXAMPLES: CONCEPT -> IMAGINATION -> CONCEPTION

As a Buddhist, the author believes in important views of Buddhism, such as "cause and effect". Cause and effect means that all things happen due to a certain cause, followed by a certain luck, which then causes a certain effect. "Cause" is the origin of things, "luck" is a boost, and "effect" is the final outcome. How to present the relationship between modern people with bonsai?

If cause and effect is something invisible, how can it be presented to the viewers? The relationship between people is like two parallel lines that never cross; they always exist in contradiction. When we think there is no link, we will meet each other at a surprisingly wonderful moment; however, when we think that we are intimate, we may gradually drift apart.

How to do? What kind of tree species can properly indicate this concept? The author found that with banyan is the best choice.

Banyan trees are characterized by a great number of aerial roots on their branches, continuing their downward growth. Once these roots reach the ground, they will insert into the soil and form strong wooden pillars. Their shapes display life energy, while their roots represent the symbol of life. Growth factors of trees include genetic factors, sunlight, water and air. These factors are like cause and effect, while the trunk, branches and aerial roots present causal accumulation of living, life and ecological progress. Trunks, branches and aerial roots interweave with each other like opportunity line, indicating mutual support and interwoven human communities. Some interpersonal relationships are of great complement and continuation and show positive energy; while other interpersonal interactions are of mutual resistance and plunder. Indeed, all of these cooperative and competitive relationships establish a life community (banyan). Banyan has a life and is an organic media undergoing birth, death, illness and old age, like evolution and adaption to special environmental conditions of interpersonal community, producing a rich cultural landscape.

PRODUCTION

Carving

First identify the unnecessary part, as shown in Figure 11, use a chisel to carve out unwanted places, as shown in Figure 12, and then cultivate the required root, as shown in Figure 13.

Figure 11. Original root. Source: Yang Hsiu.

Figure 12. Carving the root. Source: Yang Hsiu.

Figure 13. Grown root. Source: Yang Hsiu.

Wire wrapping for shape adjustment

Use aluminum wire to wrap the branches, as shown in Figure 14, make branches a certain form, as shown in Figure 15, and remove the wire when the branches are fixed, as shown in Figure 16.

Figure 14. Wrapping wire around banyan.

Figure 15. Connected branches. Source: Yang Hsiu.

Figure 16. Crossed branches. Source: Yang Hsiu.

WORKS

Previous work is shown in Figure 17. A flat and open saddle basin was used, which conformed to traditional rules. However, the author had a number of concerns. How to integrate the basin with the tree so that something may be revealed through the basin? Finally, stainless steel works were designed. A rectangular stainless steel carrier mirrored an inflexible and indifferent modern society. Through mirror reflection, the work, viewers and the environment were integrated as one, as shown in Figure 18. Different angles, time and space have different relationships, which further reflects the Zen's idea of "no-thought, no-remembrance, non-attachment", as shown in Figure 19.

After completing the traditional bonsai work, the creators wished to make minor adjustments. But this piece of work will be adjusted permanently, like cause and effect, and people's relationships. Hence, it is of great importance to turn the shortcomings of adjustments into the characteristics of the work.

All things in the universe appear due to cause and effect and will inevitably undergo changes and damages. From the sentimental world to the non-sentimental world, from spiritual phenomenon to material phenomenon, all things are in the process of movement, birth and death. Birth, death, illness and old age of common people, living and dying in the non-sentimental world are in line with law. This piece of work was produced based on the

concept of creation rather than aesthetic rules (such as gradient, symmetry, reconciliation, balance, contrast, proportion, rhythm and tone).

Figure 17. Front of the work. Source: Yang Hsiu.

Figure 18. Reflection of stainless steel. Source: Yang Hsiu.

Figure 19. Front of the final work. Source: Yang Hsiu.

CONCLUSION

With the passage of time and the development of cultural aesthetics, the definition and connotation of art also change. Can bonsai remain the same? Bonsai must draw inspirational nutrients from the art world and conduct creation with "creativity" rather than the production of "copied" designs like industrial products.

This paper provided a new bonsai process (concept -> imagination -> conception -> production -> work), and proposed suggestions for new ideas in the progress (as a mixed media, bonsai should not use forbidden branches with the aim of manifesting the

characteristics of trees) so as to enable bonsai creators to follow new scientific principles or processes and provide a reference for the bonsai industry.

Bonsai creators should also build their own personal style. However, instead of telling others their style, creators should tell others the objects, life experiences, ideas and feelings they wish to convey through this piece of work. During such processes, they will naturally form their own styles with the spirit of the times.

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Appendix I: PHOTOS (Credits: Taiwan Society for Horticultural Science)

Group photo of First International Symposium on Bonsai.

Former Chair of ISHS Commission Landscape and Urban Horticulture, Prof. Giorgio Prosdocimi Gianquinto (second from right) presenting the ISHS medal award to Symposium Conveners Dr. Hsueh-Shih Lin, Dr. Sheng-Chung Huang, and Dr. Hsin-Fu Yen (from left to right).

Prof. Giorgio Prosdocimi Gianquinto, on behalf of ISHS, thanking TSHS for holding the symposium and encouraging new friends to join ISHS.

Deputy Minister of COA, Dr. Chi-Chung Chen, welcoming the participants and thanking ISHS for its support during the opening ceremony.

President of Bonsai Clubs International, Mrs. Glenis Bebb.

Chairman, Taiwan Society for Horticultural Science, Dr. Hsueh-Shih Lin (left), giving Certificate of Appreciation to Mr. Moshe Emergui from Israel Bonsai Club.

World Bonsai Friendship Federation Chairman, Mr. Lindsay Bebb, showing bonsai techniques to symposium participants.

Mr. Michael Hagedorn (USA), showing bonsai techniques to symposium participants.

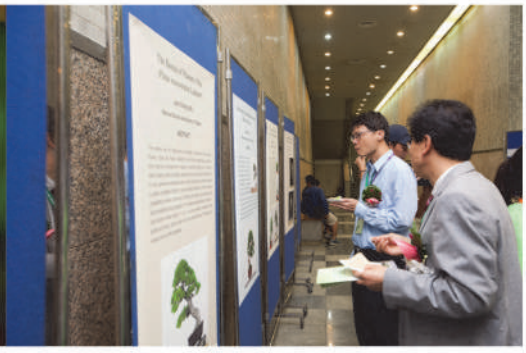
Keynote speaker Prof. Shu-Hua Li, from the Department of Landscape Architecture, Tsinghua University China, talking about the comparative study of artistic features of Chinese penjing and Japanese bonsai.

Keynote speaker, Mr. Bogdan Pociaskm, from Bonsai and Suiseki Poland, addressed the impact of climate on bonsai care in eastern Europe.

Invited speech, Juniper bonsai: nowadays and future in Taiwan, by Mr. Yung-Yu Ho.

Mr. Mitsuo Matsuda from Japan talks about 'Bonsai' the editng ability with animism and Japanese sensitivity.

Oral presentation.



Poster presentation.

Discussion after session.

Bonsai display during the symposium in the National Museum of Natural Science (NMNS).

Delegates visited the botanical garden of the National Museum of Natural Science (NMNS).

Cheng Mei Culture Park tour.

Appendix II: SYMPOSIUM ABSTRACTS

The impact of climate on bonsai care in eastern Europe

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Abstract

Knowledge of the Polish bonsai came from the interpretation of Japanese books or bonsai leaders. There was no way or possibility of a direct way for teaching. Bonsai production should consider environmental factors such as temperature and seasonal changes, based on my experience for more than 20 years. Cultural techniques, particularly water management and hormone application, are a key topic to produce bonsai. A better understanding of watering, fertilizing, and prunning techniques facilitates the regulation of tree growth and the corresponding structure. Knowledge of the tree physiology has improved the vitality of plants acquired from nature. Applying the phenology, natural growth of the plant, to bonsai production results in faster growth and well-shaped structure. The seasonal conditions caused much longer working time in Poland, resulting in a few more years for bonsai completion but with similar quality as compared with those in Japan. After working and learning the required technique in the Yamadori, we produce the tree bonsais such as the *Pinus mugo* (mountain pine) that are very popular and desirable in Europe. The production ways effective in Japan or Asia may not suit the conditions in Europe. Production of bonsai should focus on the plants' growth and their climatic requirements. Bonsai production is a long process, during which we can enjoy and communicate with nature.

A comparative study about artistic features of Chinese penjing and Japanese bonsai

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Abstract

Kentoshi (the Japanese missions to Tang Dynasty) brought the Chinese penjing into Japan 1300 years ago. Since then, enjoying and creating penjing have became popular in Japan. Actually, Chinese penjing and Japanese bonsai art have the same origin, but with the different artistic tastes. The development of Chinese penjing's style has gone through the different periods in the history, from Palace and Buddhism penjing in Tang Dynasty, Literati penjing in Song Dynasty and Xiezijing (small landscape in Yuan Dynasty, to Literati, Civilian and Craftsman penjing) in Ming and Qing Dynasty, and recently with different penjing styles in Tree, Rockery and Mountains-and-Waters. The development of Japanese bonsai has also experienced different styles in the history such as tree on stone, potted plants, bonsai, potted mountain, potted landscape, Senkeiban and literati bonsai, and recently with two mainly different styles in bonsai and rock-rater, known as two wheels for one carriage. Chinese penjing rules with no specific models cultivated a free, elegant and literati atmosphere, while the Japanese bonsai rules with specific models developed a rigorous philosophical style. Modern penjing and bonsai is seeking local tree materials, and appropriate production technology. However, the form of penjing and bonsai art for these two countries is gradually developing into a similar style. Penjing was originated from China, has been developing in both China and Japan and spreading across Europe and the United States, and has now became one of the cosmopolitan arts.

The misinformation that plagues the U.S. bonsai community

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Abstract

The Japanese version of bonsai has most heavily influenced the United States version of the art. The first bonsai creators and teachers in the U.S. were Japanese-Americans who were trying to rediscover their roots in the 1940s-60s. For several decades, the choices this group made impacted what others did in the U.S. with their bonsai, from styles of trees to soil choices. These choices were often at great variance from what was done in Japan, as none of these initial practitioners had lengthy training in Japan. Yet this period was the beginning of an American form of bonsai. Two distinct communities have since formed, one holds to the body of self-created knowledge in the U.S., and the other takes its lead directly from Japan. There is a merging now of those two, although the divide has long created two 'camps' of endeavor. Significantly, there has been a rather large body of misinformation that came out of these early years of bonsai in the United States. Some of the misinformation is technical, and some is aesthetic. The technical misinformation includes erroneous beliefs that junipers need to be constantly pinched throughout the growing season (which can kill them), to the fantasy that sharp sand makes roots fork (which is not true as such soils have lower root ramification). Also the bonsai myth that watering on the leaves in the sun results in sun-burns comes from the gardening and forestry world, recently disproved by a Scandinavian research team. Misinformation is tenacious and takes long time to dispel. For any art form that rests so heavily on technique as bonsai does, understanding the tradition makes sense as it tends to have a long history of things that work, and misinformation tends to end in damaged trees. The U.S. bonsai community is currently trying to address this issue.

Israeli bonsai – from concept to reality: an updated review of a growing enthusiasm

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Abstract

The bonsai scene in Israel is constantly evolving and growing, with great investment and enthusiasm, both individually and through organizations such as Bonsai Clubs and the Jerusalem Botanical Gardens. Study and transfer of theoretical and practical knowledge is led by local bonsai club artists and international bonsai artists that conduct demonstrations, workshops, and techniques. Using bonsai trees for landscaping as a desirable and expensive consumer product has shown a growing markets' demand. This report addresses three main characteristics of the bonsai scene in Israel, including the background of the Israeli bonsai development and evolution at different periods of its path to the present. The report discusses the current state of bonsai in Israel, including an overview and analysis of style in the Israeli bonsai scene. I will provide a future outlook to the development in several aspects of bonsai in Israel. The Israeli bonsai is influenced by old trends and new concepts, economy, and naturalistic or innovative factors in every sense.

Bonsai country report of Taiwan, R.O.C.

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Abstract

Bonsai has been developed for more than 100 years in Taiwan. Quiet poetry and three-dimensional painting are proper descriptions for bonsai. Bonsai was originated from China and Japan, and has spread worldwide thereafter. Japanese bonsai culture was introduced into Taiwan during the period of Japanese colonization. Therefore, the Japanese version of bonsai has great impact on the bonsai production in Taiwan. In the initial stage, the bonsai was not very popular and growers focused mainly on *Ficus* and elm with simple styles. In the 1980s, some bonsai masters introduced various related concepts, skills, and books from Japan, and thus upgraded the production and culture of bonsai in Taiwan. In the 1990s, bonsai masters started to create and establish "the bonsai with Taiwanese characters". With various latitudes and elevations, there are tropical, sub-tropical, temperate, and frigid zones that provide different environments for the growth of diverse plant species in Taiwan. The bonsai associations are very active and well-organized in Taiwan. There are several national bonsai associations, including National Bonsai Association of Taiwan, Taiwan Bonsai Creator Association, Pine Tree Bonsai Association of R.O.C., and Taiwan Ficus Bonsai Association. National Bonsai Association of Taiwan is composed of 22 local bonsai associations and holds an annual national bonsai exhibition "Hwa Fong". All qualified bonsais to attend "Hwa Fong" must be selected from 22 local bonsai associations with open bonsai contests. All bonsai associations are private, i.e. non-governmental organization. Many bonsai enthusiasts founded associations and operate independently based on democratic mechanism, resulting in diverse bonsai developments in Taiwan. Through various bonsai exhibitions, we encourage more people to join and enjoy the arts and beauty, share knowledge, and raise friendship.

Singapore bonsai: history, present, and future development

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Abstract

Singapore became independent in 1965 when living conditions were poor, while some elderly people from Chaozhou produced bonsai as a hobby. A local tree species, water plum (*Wrightia religiosa*), was used as the flowers are fragrant and year-round flowering is feasible under controlled conditions. Therefore, water plum production was very popular at that time. It often took at least 5 to 10 years for the completion of potted bonsais, and thus the sale price was high. Seeking plant material is crucial for bonsai cultivation. In 1973, the Singapore Chinese Chamber of Commerce held the first ever bonsai exhibition and the participants included Indonesians and Malaysians. The raw bonsai material have been imported from China, Japan, Taiwan, Malaysia, and Thailand to Singapore. In 1979, I started to import bonsai from Japan and Taiwan. From 1980 to 1990, a large number of bonsai and potted plants were imported from China. In recent years, people can learn bonsai arts from the internet and online learning. The Japanese-style bonsai are arts, while early Chinese bonsai are excellent and time-consuming to produce. Bonsai will not disappear in Singapore, since bonsai is regarded as an important spiritual necessity of life, particularly for the residents in "steel cement" environments.

Bonsai in India: a growing movement

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Abstract

Ancient Indian physicians are known to be among the first bonsai artists in the world. Ayurveda, the traditional Indian system of medicine, gave birth to bonsai. According to transcripts, a few physicians, while returning from the Himalayas, brought back with them shoots from medicinal trees. In order to propagate them, the shoots were planted in pots, which grew into trees. As time went by, the physicians trimmed the branches and cut back the roots – making them into a miniature form – thus practising bonsai. As far back as the 12th century, bonsai was known as Vamanatanu Vrikshadi Vidya (science of dwarfing trees) in Sanskrit language in India, when the practice travelled to China it became known as pun-sai – the art of growing single specimen trees in pots. In course of time, bonsai travelled to Japan, where it was further refined till it eventually reached Europe in the 18th century. In the 60s, bonsai returned to India, the country of its origin. Over the years, the art has grown in the country, thanks to pioneers who shared their knowledge by setting up clubs and conducting workshops in major cities. As interest levels grew, more clubs were formed, demonstrations were held, ideas were exchanged and artists were born, taking the art to an advanced level. Our culture and our philosophy with our flora and fauna is seen in all forms of art including our bonsai art. Art is from heart. We have a bonsai culture with more than 100 serious bonsai artists and more than 50 bonsai clubs. India routinely hosts some of the finest bonsai masters from across the world. This report addresses the growing awareness about bonsai in India, how individuals and clubs have overcome challenges and contributed to popularizing the art by working with indigenous plants, developing their unique styles and interpretations of the art form. Our bonsai clubs have a robust annual calendar of exhibitions across major cities – Mumbai alone has at least three bonsai exhibitions every year – encouraging local artists to exchange ideas and offering a platform for peer review. We, in India, have the unique advantage of a tropical climate and have used our imagination to create our own unique styles, adjusting to our indigenous flora and fauna.

‘Bonsai’, the editing ability with animism and Japanese sensitivity, not only wiring but also imagination of nature

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Abstract

All the animals eat animals and plants to connected life. For human beings, it’s easy to imagine that plants were very important. Brushing up to originally “bonsai” which sublimated horticulture to art, but the simple idea of “I always want plants to be closer” is just a feeling of relief by human desire for life sustenance (getting oxygen, and food). As a behavior not for maintaining life, the sense of feeling “beautiful” when looking at plants is probably only for human beings. The idea of compassion for green is not only oriental, and that one evolved form has sublimated to “bonsai”.

In Japan, there is a Shinto form close to nature worship or spiritual worship (animism) as indigenous faith before the introduction of Buddhism in the 6th century. It promotes the idea that the God exists in all things. It is characterized by being the basis of Japanese people. There may be a strong belief in big trees for Japanese who have a concept of treating big trees in the form of sacred trees, having a shrine at the root of the trees, and having the idea of keeping the regional unity protected.

Japan has been very lucky during a transformation of social order. Most of the new rulers destroyed former culture in the world. But this cultural breakdown and destruction were not found in Japanese culture from ancient times.

The high level of editing ability can be cited as a characteristic of Japanese sensitivity. It was good for us to scrape away useless parts from a lot of information, and it was also demonstrated in the field of our bonsai. Over the years, chewing “gardening”, add your own ideas and refine it to what is called “bonsai”.

The living art of bonsai

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Abstract

Bonsai incorporates the natural beauty and individuality of trees with the keenly developed aesthetic judgment and superior cultivation techniques of the expert to create a beautiful work of art that is more natural than nature itself. Man comes from nature and to nature he returns. Therefore, man's attitude toward nature should not be to fight or conquer but to cooperate and treasure. Oriental philosophy, especially in China, was derived from the sensibility and understanding gained through human contact with nature. Among all of nature's products, trees and stones are undoubtedly the two most closely interrelated with man's living environment. If we carefully arrange lovely trees and stones in a pot, although we may not be in the midst of mountains and forests, we can nevertheless enjoy the immeasurable pleasure and wonder of nature. It is a unique art, and has characteristics different from other arts. Bonsai may be likened to a three-dimensional painting, full of varying brushstrokes and colors. Bonsai may be enjoyed from many different angles and positions. Bonsai is also like wordless poetry. Though the bonsai tree retains its own specific characteristics, it nevertheless serves as a stimulus for the mind of the viewer to bring its own imagining into play, and the image of the bonsai therefore lingers on in the mind. Because a bonsai has its own life force and ever-changing variety, it may be thought of as living sculpture.

Juniper bonsai: nowadays and future in Taiwan

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Abstract

Junipers have been developed in 50 years, and have become one of the most important bonsai species in Taiwan. Millions of juniper bonsai have been produced recently by Taiwan growers. Various shapes are seen from the awarded junipers from national exhibitions. The improvements on junipers are really remarkable in terms of scale, shape, and performance. During the early stage, the product quality was poor due to the lack of comprehensive knowledge. Fortunately, dedicators seek better understanding of cultivation as the junipers are so attractive. "Silk carving", a special skill, is considered a representative for Taiwan juniper bonsai. Growers used and considered similar source materials, economic factors, and production methods, and thus all the awarded juniper bonsai at current exhibitions have similar versions. Junipers are flexible and can be pruned and/or trained in some effective ways. Using technology such as grafting facilitates innovative performance of juniper bonsai.

The Philippine trees

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Abstract

In Philippines, there are 3,600 native tree species in the 7,100 islands of the archipelago, of which 67% or 2,412 species are endemic. A diversity of flora and fauna is supported by these majestic trees such as the true Filipino 30 meters Balakat tree or the towering 70 meters Guijo in Indonesia, Malaysia, Thailand, and Vietnam. Our world-famous bonsai masterpieces from Pemphis Acidula, BANTIGUE, can be found in rocky shorelines of the islands in the Ilocos Region and the Visayan islands in central Philippines. Bantigue, Hai Fu Rong in Chinese, are naturally twisted and stunted in its rocky habitat into amazing bonsai materials that inspired Filipino masters to perfect its full potential as a work of art. The rapid urbanization of the country to support the growing needs of the 110 million population is rapidly depleting the natural cover of trees. Communities and farms are encroaching the natural habitat of our flora and fauna. Concerted government and private sector efforts are running after time to reforest and stop the cutting of trees by unscrupulous loggers. Hopefully, forest will regenerate for the future generation to live in an environment that supports the biodiversity that once was. Philippine trees can be categorized into lumber trees, flowering trees, fruit trees, medicinal trees and ornamental trees, with indication as endemic or indigenous to Asia. Enumerable seeds will provide the materials for man to continue the regeneration process of the forest and to beautify the communities.

The stronger the youth, the better the penjing future

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Analysis of the Young Talents Cultivation and the Future Development of Penjing Industry, China
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Abstract

Penjing, originated in China, has a history of thousands of years. It has been inherited as "three-dimensional painting and silent poetry" with the reputation of living art. In modern times, penjing artists are primarily middle-aged and elderly people, so penjing art has been regarded as sunset industry. Compared with the seniors' life attitude of moderation, self-seclusion and conformism, in the unique philosophy of the current young generation, they more favor to realize their own value and pursue their own dreams. With the development of young people's collective nostalgia for the traditional art so far, Penjing, as the essence of Chinese culture and art, begins to influence more and more young people's lives. More and more far-sighted seniors began to devote themselves to the cultivation of young talents in penjing, and show the new situation and positive energy of the Chinese penjing industry. According to 'The Prospects of Chinese Penjing Industry Market and Investment Strategy Planning Analysis Report from 2016 to 2021', a region-directed comprehensive research, it can be seen that from the 21st century, the world spent about 10 billion US dollars on special flowers annually, and the market prospect of special flower is promising, which includes the Penjing industry primarily based on modeling. No industry and trade can develop without sustainability. When youth enter the field, the fresh blood and vitality began to exert their influence, thus giving the industry creativity and vitality.

Learning from nature: advanced techniques for *Ficus microcarpa* bonsai production

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Abstract

This report addresses the history of *Ficus microcarpa* bonsai art in Taiwan and is a brief description of the general traits that defined the early stages of creation and the development of the present forms. Ancient Chinese painting and calligraphy: wild stroke calligraphy and old depictions of Chinese banyan trees have a strong resonance within the tradition of the Taiwanese. Old, twisted trunks, intertwined roots and hanging branches are a commonplace depiction in the Taiwanese landscape. A detailed study on the relationship bonsai creation has with the Chinese traditional plastic arts and how they influence the development of bonsai development will be included. The National Cheng Kung University Banyan: considered by some to be the blueprint of *Ficus* bonsai art, a brief description of the characteristics that comprise this magnificent tree will be incorporated. The detailed knowhow on how to transport these natural traits into the elements of bonsai creation will be essential to the present article. In order to accomplish this, the stages of *Ficus* bonsai art are divided into four distinct stages. Five stages of *Ficus* creation: a breakdown of the natural character of the National Cheng Kung University Banyan and its relationship to bonsai techniques will be the subject of this section. As is often commonplace in gradual development of skill, the dream of creating a *Ficus microcarpa* bonsai that resembled this tree was encompassed in three initial stages of change. Each stage will be discussed in detail, with the variance in the distribution of proportions within the tree structures being the main difference between each stage of creation. The fourth stage encompasses the wild stroke intertwined character of banyan that is inherently related to Chinese calligraphy. This fourth stage brings together and binds *Ficus* bonsai art within the range of the plastic arts. Ancient trees and world travels: bonsai has enabled me to travel all over the globe. As nature is the absolute best teacher, I have had the opportunity to witness a good number of trees, all ancient, which share the same traits. From Taiwan to Argentina and from Sydney to the USA, old trees share common ground. How these commonplace traits are shared by trees and how do we extract these ideas and incorporate them into the realm of bonsai creation will be discussed further.

Flower bud differentiation after twice bud forcing treatment in 'Full-Lucky' pear: a potential plant species for bonsai

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Abstract

A chemical practice is required to break flower bud dormancy of pear trees (*Pyrus pyrifolia* (Burm.f.) Nakai) at lowlands in Central Taiwan, due to insufficient chilling temperature in winter. High temperatures cause flower bud abortion or off-season flowering of 'Full-Lucky' pear, resulting in unsteady fruit yield. We used twice bud-forcing treatment after fruit harvesting to force new shoots bursting. Results showed that the autumn shoots ceased elongation in 20 days after bud-break, the apical meristem began to swell and started to differentiate flower buds at 80 days, the inflorescence began to form at 90 days, and the pistil and stamen were formed in the complete flower bud at 120 days. The twice bud-forcing treatment should be carried out in early September for the flower bud formation in next January.

Diversity of native bonsai plants in Taiwan

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Abstract

Taiwan has a high biodiversity, as it is located between Holarctic and Paleotropical Kingdom, with many mountains higher than 3,000 m above sea level. Potential bonsai plant material could be used or selected from approximately 4,000 Taiwan-native species. After the survey of the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung during 2013 to 2017, we recorded 101 species (9 in gymnospermae and 92 in angiospermae) and 6 varieties of native plants used for bonsai production. These plants belong to 38 families and 65 genera (5 in gymnospermae, and 60 in angiospermae). Most bonsai plants are tree or shrub, while scandent shrubs include *Ficus pumila* var. *pumila*, *Ficus tinctoria*, *Rosa taiwanensis*, *Sageretia thea*, and *Elaeagnus formosana*. *Ficus vaccinioides* is used for creeping shrub bonsai. Woody vine bonsai include *Callerya reticulate*, *Hiptage benghalensis*, *Berchemia lineate*, *Vitis thunbergii* var. *taiwaniana*, *Elaeagnus glabra*, *Gymnema sylvestre*, Littleleaf Indianmulberry (*Morinda parvifolia*), and *Lonicera japonica*.

Diversity of introduced bonsai plants in Taiwan

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Abstract

After the survey from the bonsai exhibitions and bonsai gardens in Taipei, Taoyan, Taichung, Changhua, Nantou, Taina, Kaoshing, Hualien, and Taitung from 2013 to 2017, we recorded 121 introduced bonsai plant species (12 in gymnospermae and 109 in angiospermae) and 3 varieties. These plants belong to 37 families and 80 genera (9 in gymnospermae and 71 in angiospermae). Most bonsai plants are tree or shrub type, while *Bougainvillea* and *Cryptostegia madagascariensis* are scandent shrubs, *Wisteria floribunda* is woody vine, and *Jasminum sambac* is semi-vine. Most introduced bonsai plants are fruit trees and ornamental plants. People have introduced *Juniperus chinensis* 'Itoigawa', *Juniperus chinensis* 'Kishu', *Cotoneaster horizontalis*, *Osteomeles subrotunda*, and *Acer buergerianum*. Some cultivars of *Diospyros rhombifolia* were introduced from Japan as this species is native to Taiwan and is very rare and endangered.

New methods for bonsai production: from idea to reality

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Abstract

Bonsai is created through planting plants in a ware and to be cultivated in a pot, interspersing mountain stone, etc. It also uses a technique, i.e. perform big using small to display the artistic conception of nature, and the change in four seasons. Bonsai is made up of three key elements, i.e. tree, basin and shelf. The producing process of bonsai included: 1) choosing tree material; 2) choosing the front view and tree pattern; 3) producing; 4) work. The above procedures have been adopted by more than one thousand years. In this study, the authors reviewed the above procedures and proposed a new way of creating bonsai taking tree material as an example. How to present personal idea and incorporate Zeitgeist through bonsai creation? This study adopted action research to propose the new concept of bonsai aesthetics and new creating process, i.e. 1) concept; 2) imagine; 3) ideas; 4) producing; and 5) work. The results of this study produce a new principle and process to review and follow by the bonsai community.

The effects of pot vegetables and herbs on emotional benefits and environmental preference in campus – a case study in Feng Chia University in Taichung

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Abstract

Former research mainly focused on how a healing garden could restore attention of students but seldom discussed how different planting designs could affect attention restoration. The research investigated the effects of landscaping with edible plants and common bedding plants on attention restoration of students in university. Three different settings, including mixed planting with edible plants, monoculture of edible plants and bedding planting, were designed to test their effects on attention restoration and environmental preference. Students of Feng-Chia University were selected as respondents by convenience sampling, the questionnaires were distributed and collected on research sites. Through ANOVA analysis, only 2 variables, "able to forget all the responsibility" and "able to do my favorite activities", among 12 restorative perception factors showed no significant difference in three planting settings. The remaining factors were significantly different. Comparing the four facets of Attention Restoration Theory, including being away, extent, fascination and compatibility, through ANOVA analysis in three different settings, the results indicated that mixed edible plants is significantly better than the other two settings in all facets. On environmental preference questions, all the 8 factors in 3 planting types, for only one variable, "variant elements - repetitive elements", the degree of consent of the subjects was reverse significantly different, the others were significantly different. The four facets of environmental preference, including consistency, readability, complexity and mystery, were also compared through ANOVA analysis in three different settings. The result also showed mixed edible plants was significantly better than the two other treatments in all facets. It is suggested that, because edible landscape is comparably rare in campus, mix-planted edible landscape has better ability to catch students' eye and also help restore their attention. According to the research results, the mixed edible plants landscape in campus could be adopt in campus as mentioned above.

The flowering control techniques for bougainvillea bonsai production

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Abstract

***Bougainvillea* spp. is a perennial flowering plant. With colorful bracteoles and long flowering period, bougainvillea is now widely grown in Taiwan. Ways to enhance natural flowering of bougainvillea include short photoperiods, low night temperatures, high light intensity, water deficit, shoot bending and plant growth regulator use. However, the extent of shoot developmental stages to be ethylene-sensitive remains unknown. The shoots were categorized into four classes: vegetative shoot, flowering shoot stage 1 with fully-developed thorn-inflorescence axis (FS1), flowering shoot stage 2 with visible flower bud (FS2), and flowering shoot stage 3 with blooming shoot (FS3). Plants at each stage were sprayed with 75 mg L^{-1} ethephon (2-chloroethyl–phosphonic acid) and results showed that ethephon accelerates the shoot maturity and enhances flower formation. Moreover, the ethephon treatment of reproductive bougainvillea shoots increases the ACC content beyond that of the vegetative shoot. Therefore, reproductive shoots produced more ethylene than vegetative shoots, subsequently inhibiting the development of flowers or even causing serious abscission of flower buds and leaves.**

Cultivation management and prediction of flowering in potted azaleas

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Abstract

The azaleas, mainly cultivated in the north of Taiwan, are widely used in the park, landscaping and potted plants. Currently, azaleas often exhibit poor growth and it is difficult to predict the flowering period in Taiwan, possibly due to the variations of growth environments and management. This study at National Taiwan University (NTU) was to improve and establish the annual preserving management schedule of hirado azaleas. The lowest irrigation timing was at one-third of the field capacity, blade angle was 75°, and leaf water potential was -1.03 MPa. Symptoms of iron deficiency were expressed as interveinal chlorosis on the young leaves in hydroponically-grown azaleas. Chlorophyll meter reading and the iron concentration in new leaves increased as iron concentration in hydroponic nutrient increased from 0 to 10 mg L^{-1}. We calculated the weather data from 2013 to 2016 and the temperature records on the half flowering (the bud diameter is 5.8 mm to blooming) of azaleas in NTU. Results show the accumulated temperature of 316.4°C was required for full bloom.

Production of small-sized potted flowering Frangipani plant

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Abstract

***Plumeria rubra*, or Frangipani, is a small tropical deciduous tree with showy flowering clusters. *Plumeria* is mainly planted in grounds in gardens and parks for ornamental purpose, but it can be containerized as well. This study involved the applications of paclobutrazol (PP333), a growth retardant to minimize the size of 5-inch potted *Plumeria* 'Penang Peach'. Ethephon, an ethylene releasing agent, was applied eight weeks later to investigate its effect on floral bud formation. The result showed that 200 mg L^{-1} of PP333 foliar spray in spring could shorten the internode of potted *Plumeria* by one-third, which eventually made the flowering plant shorter than 40 cm in height. Leaf growth had no significant difference between the PP333-treated plants and the controlled plants in the investigation period. Leaf length was shortened by 20% comparing to the controlled plants, and the degree of the leaf greenness of the PP333-treated plants was slightly higher, quantified by chlorophyll meter reading values. The earliest inflorescences emergence was found in early July on the plants that were treated with PP333 but no ethephon. Application of twice ethephon foliar sprays of 1000 mg L^{-1} from late June to early July abscised all the leaves of the treated plants and ceased their growth by 30 days. Another evident inflorescence emergence was observed in early August on the ethephon-treated plants that were not treated with PP333 before. However, inflorescence emergence was not found neither on the controlled plants, nor on the plants that were treated with PP333 followed by ethephon. We concluded that both of those two growth regulators might have a certain degree of inflorescence promotion of potted *Plumeria*.**

Effect of pruning degree on shoot growth and flowering of guava (*Psidium guajava*): a plant material for bonsai

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Abstract

Guavas (*Psidium guajava* L.) are important tropical fruit trees and are used for bonsai production in Taiwan. New shoots with flowers can emerge from the mature shoots of current season. Taiwanese growers use pruning techniques to induce flowering shoots and control the fruiting season for year-round production. The objective of this research was to investigate the effect of different pruning degree on shoot growth and flowering of 'Jen-Ju' guava. Results from this study showed that heavy pruning resulting in the smallest canopy, while plants after light pruning had the largest canopy. Pruning degree did not significantly affect the length of newly emerged shoots from the first node of mature shoots. Heavier pruning resulted in fewer flowers per branch. The average flower numbers per shoot were 2.7 in heavy pruning, 12.3 in moderate pruning, and 19.0 in light pruning. Different pruning degree can be used to control the plant canopy, induce the flowering shoot, and regulate the flower number.

Container cultivation of Chinese bayberry ‘Dongkui’

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Abstract

Chinese bayberry (*Myrica rubra* Sieb. et Zucc.) is used as a fruit and ornamental tree in Taiwan, valued for its sour and sweet fruits with bright red color. The cultivar ‘Dongkui’ is popular because it has large and sweet fruits, vigorous growth, and high branching characteristics. However, ‘Dongkui’ tree has a long juvenile period up to 4-5 years and reaches 3-4 m height when mature, which is difficult for harvest and pest control. Container production of landscape tree is a recent trend, with high survival rate due to the lack of transplant root disturbance. Grafted saplings were transplanted in 15- and 24-cm diameter plastic pots containing 1 peat:1 perlite:1 loam in the first two years, and transplanted to 30-cm diameter root control bags. Result showed that container-grown Chinese bayberry flowered 1 year earlier and was 50 cm shorter, as compared with field-grown plants.

The effects of irrigation schemes and substrate depth on the growth of sedum bonsai on extensive green roof in Taiwan

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Abstract

Sedum has been confirmed suitable as cover plants for extensive green roofs in Taiwan in earlier studies. However the optimal depth and composition of soil and the irrigation scheme in different seasons have not been identified yet. As the main restraints of adopting extensive roof in Taiwan include cost of construction and maintenance for both roof and plants, the study explored the effects of depth of substrate and irrigation intervals in different seasons. A 50×50 cm planting box module was designed for ease of construction, maintenance and replacement. Four species of sedum were planted in a module with substrate depth 7.5 or 15 cm, and the irrigation scheme was once a week or no irrigation. The results showed that there were significant differences in growth and green coverage between 7.5 and 15 cm. Sedum plants in 15 cm medium grew significantly better than in 7.5 cm. But there was no significant difference between the two irrigation schemes. Although the load of 15 cm depth planting module is higher than 7.5 cm, it is still under the common roof load limit in conventional buildings in Taiwan. The sedum plants could grow well in 15 cm depth planting modules without irrigation in spring and summer in extensive roofs in this study. As there was considerable precipitation this year, long term sustainability of this module still needs to be monitored.

Morphological diversity of crabapple in Taiwan: a potential plant species for bonsai

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Abstract

Crabapple (*Malus* spp.) is a well-known landscaping tree because it has brilliant flowers and colorful fruits. Crabapples were introduced to Taiwan as the rootstock of apple trees cultivated in the highland regions during the 1960s. The introduced crabapple populations exhibited a large diversity of flowers, fruits, and leaves, thus resulting in confusion and/or difficulty for selection, utilization, and taxonomy. The objective of this study was to establish a database based on morphological traits including leaf, flower (type and color), calyx retention, and fruit (setting, size, color, and persistence). We examined 32 plants from 10 crabapple accessions grown at the Fushoushan Farm, located in central Taiwan. Results showed that the crabapples have a lanceolate or long-ovate leaf shape and a serrate leaf margin with erratic depth. The ventral side of the leaf is glabrous, pilose or villous. All accessions are spur bearing. The inflorescence is umbellate, the perianth type is regular with five petals, and flowers are single. The color of unopened flower (balloon stage) ranges from dark red to light pink; petal color at anthesis is red, medium pink, or white. Fruit setting is medium to numerous. Mature fruit size ranges from 1.4 to 3.7 cm in diameter, and thus, accessions may be categorized into large (2.5-5 cm) and medium fruit (1.3-2.5 cm) groups. Fruit shape is globose or obloid. The calyx is absent or present. Peel color is yellow, light red or dark red, with or without red blush strips. The skin is glossy or slightly rough with a medium number of lenticels. Fruit persistence varies from short to very long. Crabapples have great potential as plant material for bonsai, particularly with intensive flowers and fruits, brilliant color, and long persisting fruits without a calyx.

The bonsai of Masson's pine (*Pinus massoniana* Lambert)

Jian-Chang Wu
National Bonsai Association of Taiwan

Abstract

Tree species used for making red pine bonsai in Taiwan are from Japan, Ryukyu, Korea and Taiwan. Masson's pine (*Pinus massoniana* Lambert), which is native to Houyanshen of Taiwan, is the best among all. It is easy to grow for lowland, tolerant to pruning, and grows vigorously. But it is also sensitive to temperature and humidity changes, and could not adapt to places completely different from its natural habitat. Masson's pine is mostly propagated by seeds commercially. Offspring with better performance could also be selected during propagation. The suitable characteristics for bonsai include shorter needle length (< 10 cm), vivid green needles, needles in neat bundle and strong, and dry bark that does not easily detach. Selected individuals can be graft-propagated.

Creation and care of scale-leaf juniper bonsai in Taiwan

Zong-Yu Wu
Small-potted Bonsai Association of Taiwan

Abstract

Scale-leaf juniper bonsai in Taiwan often simulates tree shape of Yushan juniper (*Juniperus squamata* Buch.-Ham. ex Lamb.). Yushan juniper is characterized by its ever-changing tree form and its unique entwined dead woods and living woods due to bad weather conditions at natural habitat. During the creation of scale-leaf juniper bonsai, the direction of growing branches depends on the winding adjustments by using aluminum wires. The unique ornamental dead wood is formed after careful cuts. Full sun condition is recommended to avoid formation of excess needle leaf. Sandy loam provides better draining and aeration. Irrigation frequency should be higher during summer to achieve cooling, while watering should be done before noon during winter.

The creation of saw-leaf zelkova (*Zelkova serrata* (Thunb.) Makino) bonsai

Wen-Hu Xie
Bonsai Artist Association of Taiwan

Abstract

Japanese zelkova (*Zelkova serrata* (Thunb.) Makino) is categorized into red and green young leaf types, and erect and arching branch types in Taiwan. Among all, those with red young leaves and erect branches are considered the best. Successful zelkova bonsai should be smooth from trunk to twigs, and have abundant branches after leaf drop. Japanese zelkova bonsai can tolerate small pots without significant branch loss, and therefore has a longer bonsai life. Cutting propagation is often used. Trees could be transplanted into ornamental pots after 3 years of cultivation. A broom type bonsai should be formed in 5-6 years, and a bigger bonsai needs at least 15 years to be achieved. Year-round management of the Japanese zelkova bonsai in Taiwan is as follows: defoliation and pruning from late January to early February, from late May to early June, and early September, and transplanting from late January to early February. Small and medium bonsai should be transplanted annually, and big bonsai biannually.

The creation of headache-tree premna (*Premna serratifolia* Linn.) bonsai

Chang-Xiw Xiao
Small-potted Bonsai Association of Taiwan

Abstract

***Premna serratifolia* Linn. is native to the coastal area of northern Taiwan, Taitung and Hengchun. It is characterized by naturally-forming dead wood and thus valued in bonsai creation. Other characters include strong growth vigor, pruning tolerance, significantly changing leaf sizes, and dense branches. Grafting small-leaved species could also dramatically change leaf characters of already made bonsai. Tree types of *Premna serratifolia* could be semi-cascade or triangle. Trees with well-formed entwined dead and living woods could moderately reduce leaf portion in order to emphasize dead wood parts.**

Application of horticulture and music therapy to elderly people with dementia

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Abstract

Horticultural therapy is a time-proven practice. The therapeutic benefits of garden environments have been documented since ancient times. Music therapy is one of the expressive therapies, consisting of a process in which a music therapist uses music and all of its facets – physical, emotional, mental, social, aesthetic, and spiritual – to help clients improve their physical and mental health. In this study, the qualitative case study was adopted, which included both horticulture activity and music activity to investigate the influence on dementia in old people. The results of this study can support both the references of activity schedule and design for care and nursing homes. Also, it can contribute to improve the life quality and social stability for old people with dementia and their family. In addition, in academic research, contributing research results will appear.

Evaluation of urban residents' impressions for small-sized bonsai "Kokedama": a case study of Atsugi City in Japan

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Abstract

As for Japan, bonsai has been regarded as a leisure activity for elderly people for many years. Recently, however, it has been widely enjoyed by many generations. Especially for people living in urban areas, bonsai is regarded as ornamental plants used for decorating rooms of their houses. Since many urban residents do not have enough space outside to grow plants, they prefer small-sized bonsai to suit their rooms. Although there are many kinds of small-sized bonsai, one of the most popular ones is "Kokedama", i.e. "moss ball" in Japanese. It is made by a plant out of the pot and into a ball of soil held together with a moss and string. Therefore, Kokedama is considered a new form of bonsai, but has many unknown aspects. In this study, we investigated how urban residents consider and evaluate Kokedama. We conducted a questionnaire survey with urban residents visiting the Urban Green Fair held in Atsugi city, Kanagawa prefecture. As a result, it appeared that urban residents evaluated Kokedama from two points of view. One is the aspect of "soothing." Most urban residents considered Kokedama to soothe minds and reduce stress in daily lives. The other is the aspect of "ornamentation" in that Kokedama provides a Japanese traditional impression and creates a warm atmosphere. In addition, we found that the older generation evaluates the aspect of "ornamentation" more than the younger generation in urban area. Thus, Kokedama has a potential to help urban residents without enough space for growing plants outside to improve their quality of life.

Seventeen years of bonsai production in China

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Abstract

The production of bonsai has a long history in China. It can be traced back to the Neolithic age and became mature in the Tang Dynasty (618-709 A.D.). During the Song Dynasty (960-1279 A.D.), bonsai skill was further improved, and it became more delicate in the Yuan Dynasty (1271-1368 A.D.). The bonsai theory was further developed and matured in the Ming and Qing period (1368-1912 A.D.). Finally, benefited from the reform and opening policy in China, the bonsai art has been greatly developed and the production has been expanded tremendously in the past 40 years. This paper analyzed the bonsai production situation in China in the past 17 years starting from the new century in 2000 through 2016. Data are collected from the national annual flower statistics released by the Ministry of Agriculture, China. The planting area, sales volume, and export volume in this period in China are compared and analyzed for all potted plants, including potted flowers, foliage plants, and bonsai. The sales amount of the total potted flowers was increased by 5.5 times in the past 17 years from 5.25 billion CNY in 2000 to 34.16 billion CNY in 2016. The export amount of the total potted flowers was increased by 5.45 times from 19.55 million USD in 2000 to 126.00 million USD in 2016. Special attention is paid to the production of bonsai with its added value and to the export volumes in Fujian province as the export volume of its potted flowers ranked first in China for seven consecutive years starting from 2010. Some conclusions are drawn based on the above analysis and suggestions are given for the future production of bonsai in China.

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