

THE JAPANESE KNOTWEED

ENVIRONMENT, TRADITIONAL KNOWLEDGE AND CHALLENGES FOR THE FUTURE:
FROM JAPAN TO ITALY



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INTRODUCTION

BOTANICAL ASPECTS: CLASSIFICATION AND DESCRIPTION

Japanese knotweed (*Fallopia japonica* or *Reynoutria japonica* or *Polygonum cuspidatum*) is a large herbaceous, rhizomatous perennial herb originating from Asia, and specifically native to Japan, Taiwan and South Korea.

Kingdom: Plantae

Clade: Angiosperms

Clade: Eudicots

Order: Caryophyllales

Family: Polygonaceae

Genus: *Fallopia*

Species: *F. japonica*

The plant is a vigorous growing herbaceous perennial with annual tubular, glabrous stems that ascend from an erect base. These stems are light green often with reddish flecks, branched and reach up to 3 metres in height (Beerling et al. 1994). Where introduced, *F. japonica* is generally taller than in its native range in Japan (Holzner and Numata, 1982), where it is recorded as being 0.3-1.5 metres tall (Makino, 1997). Stems arise from strong rhizomes to form a dense thicket. Rhizomes are thick and woody when old, and have been recorded as spreading 5-7 m laterally (Pridham et al., 1966). The rhizome has ring-like structures at about 2 to 4 cm intervals which are reduced leaf scales, whilst on the underside are adventitious roots travelling into the soil. The rhizome snaps like a carrot when fresh to reveal a yellow/orange colour. The main aerial shoots emerge from the large bulbous rhizome crown about 30 cm x 30 cm across. This acts as a carbohydrate store in the winter months when it represents the complete live biomass of the plant. Spreading out from this central region are a number of radial penetrating rhizomes that twist together to form a sizeable and considerable penetrating force. The leaves are 5-12 cm x 5-8 cm, broadly ovate, cuspidate at the tip and truncate at the base. At the base of each leaf petiole is located a small gland that functions as an extra-floreal nectary. The flowers are

off-white and borne in ochreate clusters of 3 to 6 on terminal and axillary panicles, with the main axis up to 10 cm long and with slender branches 5-9 cm long (Lousley and Kent, 1981).

HABITAT AND STANDS (Shimoda and Yamasaki, 2016)

In Japan, Japanese knotweed is well widespread and occurs from Hokkaido to Kyushu, respectively the northernmost and southernmost main islands of the Japanese archipelago. A field research, with the aim of studying the characteristics of the plant according to different environments and habitats, types of soil and altitude in a pretty circumscribed but variegated area, that is Mount Fuji area, was carried out by Shimoda and Yamasaki in 2008. The variety of habitats for Japanese knotweed is high, running from lowlands to alpine areas and from natural habitats to human-made habitats and anthropogenic vegetations, namely close to residential and cultivated lands. It was found also in road verges and parking lots, roadside embankments, forest edges and other disturbed grounds, in the Fuji River floodplain at its mouth (2 metres above sea level) and in the volcanic desert above timberline (2415 metres).

It grows in both horizontal ground and in slopes (up to 32°), as well as in a wide range of soil types, which prevalent composition may include sand, gravel, rock and litter. The soil in which the plant grows is more likely to be dry to slightly wet, whilst it was never observed on waterlogged soil. It occurs mostly in pure stands or nearly pure stands. In this last case, among the species most frequently found together with Japanese knotweed were *Miscanthus sinensis*, *Pueraria lobata*, *Artemisia princeps*, *Anaphalis margaritacea*, *Cirsium nipponicum* (var. *incomptum*), *Senecio nemorensis* and *Solidago altissima*. Correlation between altitude and average height of the plant was found, showing that it becomes shorter and shorter with the increasing of altitude, especially above 2000 metres. Furthermore, it was found that the frequency and time of cutting have a great effect on plant height (shorter when cut repeatedly), especially below 2000 metres.

The plant grows densely in all of the stands, except for the volcanic desert in which it forms sparse stands, and the shape of them are usually long and narrow, especially around forest margins and along roadsides, even though elliptic and round stands were found as well.

The only constant characteristic observed is that the all habitats were restricted to open, sunny sites.

Phytosociological studies conducted in Mount Fuji area in the seventies and eighties reported Japanese knotweed as a significant component of natural and anthropogenic vegetations over wide ranges of altitude and habitat type. These include: the sparse herbaceous vegetation of the volcanic desert, herbaceous or shrub communities on forest edges, in grasslands, on roadside slopes and embankments, on deforested areas on abandoned fields and on riversides. The most abundant growth was however limited to the herbaceous communities of the volcanic desert and to roadside forest edges.

Japanese knotweed as a constituent species of other numerous and diverse plant communities (such as *Artemisietalia principis*, *Artemisietea principis*, *Bidentetia tripartitae*, *Phragmitetia* and *Mischantea sinensis*) was reported in other phytosociological studies of vegetation in other parts of Japan, mostly in Kanto region, in more recent years. They range from natural to anthropogenic vegetation, and from herbaceous to mown/grazed grasslands to woodland vegetation.

INVASION AND CONTRAST IN EUROPE

Japanese knotweed was introduced to Europe and North America as an ornamental plant in the nineteenth century and it is widely naturalised in these areas (Beerling et al., 1994; Barney et al., 2006). As it turned out to be very invasive, the plant is regarded as a serious threat to biodiversity (Gerber et al., 2008) and urban settlements. In the UK, for instance, there is extremely stringent legislation regarding disposal of soil contaminated with rhizomes of Japanese knotweed (Wildlife and Countryside Act, 1981; Environmental Protection Act, 1990; Child and Wade, 2000). According to these disposals, the soil containing Japanese knotweed roots is considered as contaminated, so any action leading to the spread of the plant, including digging out, removal from site and burning the waste, is severely controlled or even prohibited. This is due mostly to the fact that even a tiny rhizome from its roots can regenerate the plant if left in situ, and new rhizomes make the plant thrive and gain ground relentlessly. Chemical treatment (e.g. glyphosate) is equally problematic, inasmuch Japanese knotweed commonly spreads along the banks of water courses making it environmentally less practical, more dangerous and thus more controlled.

Furthermore the root system, which can grow down up to 3 metres and radiate outwards up to 3 metres, is able to grow through most materials. In this way it can spread through walls, roads, infrastructures and private building foundations,

leading to structural damage, financial debilitation and legal compromise (Mclean, 2010).

Classical biological control has considerable potential for management of Japanese knotweed throughout Europe, especially those impacting habitats where chemical use is all but impossible. It consists in the intentional introduction of highly specific coevolved natural enemies from the area of origin of the target weed, and involves the use of other weeds as well as insects (Shaw et al., 2011; Pain, 2014).

Concerning Italy, the first historical presence in Trentino Alto Adige dates back to the beginning of the XX century, more precisely to 1905 with the first highlightings. The main problem manifests itself in Rendena Valley, where spontaneous warnings about the plant colonisation coming from experts and local people started about 30 years ago, although the phenomenon was underrated at the beginning. Nowadays, people have become more and more conscious about the invasiveness of the plant, which is remarkable, due to the fact that it's taking over and literally modifying the landscape.

ETHNOBOTANICAL VIEW IN JAPAN (Shimoda and Yamasaki, 2016)

Japanese knotweed has been a familiar and useful wild plant for Japanese people since many centuries. If we only think about the variety of names with which the plant has been called, and the aptness of these names to describe how the plant was viewed and used by local people, we start to get an idea of the great importance it has been taking on. "Itadori" is the standard Japanese name today, even though it was reported with this name starting from the tenth century after Christ. "Tajih" is an even more ancient name, reported for the first time in 720 A.D. A dictionary of local names of Japanese plants recorded 689 words for Japanese knotweed, the most of any plant listed (around 2000). The meaning of only 381 of those names is understood with modern language, demonstrating the high locality of the names and the spread of the plant throughout all Japan. All these names describe mostly characteristics of the plant (e.g. shapes of matured stems and young shoots, snapping sound of young stems and sour taste) or the habitats in which the plant thrives (such as along rivers and in mountains)

There are several historical documents, starting from the eighth century, that outline the knowledge about Japanese knotweed and its uses. They include both authoritative nationwide books and local documents. Just to quote some, in the *Engi*

Shiki (Regulations and Laws of the Engi Era), compiled in 927, Japanese knotweed is listed as one of the edible spring plants, and a method to preserve it with salt is described. In *Wakan Sansai Sue* (Illustrated Japanese-Chinese Encyclopaedia), published in 1712 (Edo Era), the life cycle and shape of the plant, as well as its medical uses, are described. *Honzo Hofu* (Illustrations of Japanese Plants), published in the first half of the nineteenth century, reports that the plant “grows in wilderness, and emerges from old roots in spring. The young stems have joints like bamboos sprouts, are cooked and eaten. Little children eat them raw, and they taste sour”.

In some of the local documents, the knowledge of the authors appears sometimes to be more limited. For instance, in *Geibi Dosan Zufu* (Illustrations of the Products of Geibi), dated 1737, no uses of the plant for food or medicinal purposes are reported to be known. It was reported also that the plant does not bear neither flowers nor fruits. Likely, Japanese knotweed without flowers was familiar to the local people as a plant grown in frequently mown habitats. Nevertheless, in some other local documents of 1780-1829, the Japanese knotweed was listed as an edible plant in Kanesawa village and as a wild herbaceous plant with beautiful flowers in Kanehiro village and Kurose village.

As already stated before, according to the documents Japanese knotweed is a well known and widespread plant among people (in rural and not rural areas), and it has many ethnobotanical uses. In the previous centuries It was mostly used as food, especially the young shoots, normally and also during famines as an emergency plant. Other uses were as a medicinal plant (the rhizomes), as a substitute for tobacco (young leaves), for dye and for flower arrangement. Nowadays the plant is still regarded as useful. It is still a popular edible plant in spring and its dried rhizomes have been used in traditional medicine, mostly for excretion of urine, evacuation, menstrual irregularity, coughing and as a sedative. For children, young stems snapped from the plant used to be a snack (this practice has been reported since the Edo era), and were a material for making water wheels. At present, however, children are reported not to be as interested in the plant as in the past.

AIM OF RESEARCH

The aim of our research is to present two different ways in which humans relate to Japanese knotweed. Traditions, knowledge, culture, environment, uses and beliefs strongly influence local people's point of view on this plant. We will analyse these

factors in order to recreate a full picture of the existing relationship between local people and nature.

We will make a comparison between two very different realities: Japan and Italy. We will describe how Japanese knotweed is perceived in both cases and how people are finding ways to coexist with it.

An in-depth look at two different cultures and how one can learn from the other will complete the research.

RESEARCH METHODS

The research was conducted in two different countries, Japan and Italy. Personal in-field observation and face-to-face interviews were carried out with a total of 19 people, 5 in Nagano Prefecture (Japan), 10 in Yamagata Prefecture (Japan) and 4 in Trentino Alto Adige region (Italy), according to a pre-set list of questions. These last referred mostly to the period of first contact in life with Japanese knotweed, the places where it can be found, the local general knowledge and traditional/experimental uses, the beneficial or noxious known properties of the plant to humans and to environment, the methods/criteria and timing of eradication/harvest of the plant.

No inclusion/exclusion criteria of sex, age, race, religion, culture or level of instruction were used to select the interviewees. Rather, it was based on the likelihood of the people to know the plant. The range of age goes from 42 to 89 years old.

RESULTS AND DISCUSSION

JAPAN

As previously stated, Japanese knotweed is a pretty known and used plant among people in all Japan, and it is a very good example of the inextricable link between nature and culture. The traditional environmental knowledge about this plant is strong, even though it is considered by current local population to be at risk of falling into oblivion within the next few generations. The younger population is reported not to be interested for instance in learning the preserving techniques, mostly because they do not really need to eat wild vegetables anymore. Only in the cases of chefs (or other jobs related to plants) training or families where the plant is still used at

home, youngsters are taught about the plant. Therefore there is a need to preserve the knowledge behind it.

The absolute majority of the people we interviewed in Japan came into contact for the first time with the plant when they were children, mostly because they used to eat it or because they stumbled upon it, as it was curiously reported, during walking home from school and vice-versa. In this case, the stem of the plant was used as a snack, or a pastime, namely nibbled to get the typical sharp and sour taste. In most of the cases, it was the father, or the mother, who taught the offspring to recognise edible plants (Japanese knotweed is one of them), and this knowledge was conveyed to them by their parents in turn, and so on and so forth. Thanks to the fact that with maturation the stem becomes larger, stiff and hollow, some children used to use it as a small flute, while old men as a walking stick.

Japanese knotweed was reported to be found in natural environments such as mountains, forests, along rivers and close to fields, as well as anthropogenic environments such as along roads and in villages. People do not cultivate it, and they usually do not eradicate it, mostly to pay respect to the naturalness of wild plants and their environment. Nevertheless, sometimes it happens that it is contrasted by cut where there is too much of it, especially at the borders of rice-fields in order to limit the damage to the crops. For the rest it is diffusely not considered by people as harmful for the natural and anthropogenic environments.

There are several traditional uses of Japanese knotweed, most of them related to preserving and eating the plant. It is usually harvested from spring until summer starts, when the plant is still small and less hard to eat. The criteria for harvesting are various, ranging from length (from 30 to 80 cm) and thickness of the stem, to timing (from when it starts to sprout up to 10 days after it sprouted). It was also reported that people buy them directly from foragers.

The preservation techniques are useful for delayed consumption of the plant, namely in winter and the whole year around. Very often, the plant is preserved in salt, but also pickling in sake lees was reported. The best part suitable to be eaten is the stem, and the best variety is the one found close to watercourses and in rivers' banks, even though a preference for the mountain variety was also reported. In any case, there was accordance on the fact that the best stems are the young, short and large ones. There are different ways in which the plant is consumed. It is often eaten raw, after removal of the outer part in order to expose the tender part, rich in sap. Miso sauce or even western sauces like mayonnaise are sometimes used to

accompany it. In some other cases it is cooked, more often stir-fried, with miso or soy sauce, or used to make "Nimono", a traditional dish in which the principal ingredient (in this case Japanese knotweed) is simmered in a *shiru* stock, with the addition of soy sauce and a sweetening, mostly sugar. The leaves are not traditionally eaten because described as tasteless, but some experimental uses to make tempura, especially when the stems become too hard and dry to be eaten, were reported. It is curious to observe that the leaves turn their colour into yellow while being fried to obtain tempura, offering thus an interesting chromatic possibility for garnishment of a dish.

Japanese knotweed is also used as a painkiller in traditional medicine, especially in Hokkaido, where the best variety for this purpose was reported to be found. It is traditionally consumed as an infusion made with the leaves, or in a more modern way sold in the form of food supplement, to treat joint pain. The name *Itadori* itself describes this use. "Ita", indeed, literally means "hurt" and "dori" means "take"; so basically it takes away the pain. But besides these presumed positive anti-inflammatory properties, also a negative effect related the consumption of the plant was reported. Due to the strong presence of oxalic acid, the plant is a potential main factor for the onset of gout, which is why it is not frequently eaten but some people.

Another modern use is for cosmetics (Bo et al., 2015). The plant is in fact an important and commercially viable source of Resveratrol (Huaguo et al., 2013), a powerful antioxidant. The testimony of a cosmetics producer, whose firm is based in Tokyo, reports that Japanese knotweed (both stem and leaves) is used in creams and lotions for sensitive skins in a proportion of 5%, prior extraction of the active principles in a solution of 50% alcohol. The price is pretty low, due to the fact that the plant is available in big quantities, and it is sold mostly in Japan and South Korea.

According to these testimonies, and as already stated by Shimoda and Yamasaki (2016), we can eventually assume that Japan knotweed is not considered as a pest by Japanese people. It is rather seen as a "Sansai", namely a wild edible plant, term that holds the potential of the plant to be used as a precious resource also in the future.

ITALY

The Japanese knotweed has been present in the Italian territory for about ten years. The species arrived from Japan to Europe as an ornamental plant and, coming into contact with the native natural environment, they began to proliferate rapidly invading the indigenous ecosystem.

The Japanese knotweed is rather widespread in the North of Italy, in particular it is observed in: Trentino Alto Adige, Valle d'Aosta, Piemonte, Lombardia, Veneto, Liguria; but it is also present in Friuli Venezia Giulia and Emilia Romagna. It is important to report that, not being present male individuals, the reproduction happens by vegetative way, through the diffusion of rhizomes or parts of the stem. These, once in contact with the ground, are able to take root from the internodes of the stem or from the rhizomes, giving rise to new individuals. It is also possible the underground expansion of rhizomes. Throughout all the Italian territory the plant is listed as invasive and it is causing serious problems to the native natural environments, to the crops and to the society itself. Italian biologists are monitoring and studying the species in order to find an effective method of containment.

A part of our team had the opportunity to closely study the Japanese knotweed in one of the first environments in which it has arrived: Trentino Alto Adige. Marco and Alessandra spent a week in the wild and pristine woods of the Rendena valley with Eleonora Cunaccia, a great expert and wild herb forager. Thanks to her help, they could observe the expansion of the plant and the relationship that has been established with the inhabitants of the valley. It would seem that it arrived in this territory as an ornamental plant for the first famous hotel of Madonna di Campiglio, and then it came into contact with the native natural environment starting a rapid expansion.

Today the plant can be observed along the entire course of the Sarca river, at the edge of the forests, in fields and in disturbed environments like abandoned quarries, warehouses, and uninhabited houses. The Japanese knotweed is a very strong plant, fast in growth and with an exceptional ability to adapt to different climates, environments and altitudes. These characteristics make it an extremely invasive plant, dangerous for the indigenous ecosystem.

The Japanese Knotweed also releases substances in the soil that inhibit the growth of other plants, supplanting the native vegetation and creating monospecies unit. For this reason the plant is altering ecosystem relations and threatening the biodiversity

of the territory. Another serious observable consequence is the hydrogeological impact of the plant. The Japanese knotweed roots are not able to hold the soil along the riverbanks and this causes dangerous problems during the overflows of rivers and in case of heavy rains.

When the plant grows near masonry works it often happens that the roots break the foundation and invade the ground. The most serious consequence for human is the invasion of cultivate fields. The local farmers we interviewed do not know the plant and the correct methods of eradication. Most of the times they simply cut the stem of the plant, but this practice does not harm the robust underground roots. Also the disposal of the cutted stems is a practice that requires attention. In fact new rhizomes can be generated from the internodes of the stems and then it is necessary to burn them. Most of the inhabitants of the area are unconsciously contributing to the diffusion of the plant.

To better understand the situation in Trentino Alto Adige we have interviewed Giuliana Pincelli, forest ranger of the "Adamello Brenta" natural park and one of the responsible of the study and monitoring project of the Japanese knotweed in this territory. After carefully studying the plant and understanding that it is not harmful to human health, Giuliana herself has experimented the Japanese knotweed in baking a cake with the leaves. The taste results slightly sour, but not unpleasant to the palate.

She explained that this plant has been present in the Rendena valley from 30 years and today it is a real problem for all the inhabitants. In 2014 the T.E.N project (Trentino Ecological Network), organized by the "Adamello Brenta" natural park, started to raise the problem in the action 18 "Demonstrative action of control of an invasive species: the eradication of the Japanese Knotweed" (http://www.lifeten.tn.it/actions/demonstrative_actions/pagina13.html). Therefore it started a process of eradication lasted from 2014 to 2016. All the plant specimens were identified and mapped, and five cuts were made each year from May to September. It takes five years to completely eradicate a group of Japanese knotweed, but by the end of 2016 the presence of the plant has been reduced by 2/3. In 2014 the "Adamello Brenta" natural park also tested the use of a Finnish product: a birch wood distillate used as a natural herbicide. This product was tested on a group of Japanese knotweed near the village Spiazzo, but it was observed that the only damaged parts were the leaves and not the strong roots. Even if the

experimentation did not lead to the expected results, it has been very useful to raise the awareness of the population and public bodies. The action also involved the Agricultural College of the University of Padova, where a thesis consisting in the experimentation of two natural products, acetic acid and pelargonic acid, on the Japanese knotweed was developed. It was observed that the pelargonic acid represents a valid method to weaken the plant, but it is very expensive and it is however necessary to combine it with eradication actions. In the municipality of Pelugo a further experimentation has been tested: the pyroherbicide. This method consists in a rapid passage of the flame on the stems, causing a thermal shock of the whole plant. This practice is especially effective on leaves and stems, it is able in fact to burn the roots only to a maximum of 5 centimeters of depth. The most natural method used so far is the pasture: the combination of goats and pigs in order to eradicate both the stem and the roots.

Another possible solution could be the use of *Aphalara itadori*, a species of psyllid from Japan which feeds on Japanese knotweed. Currently, *Aphalara itadori* is the only arthropod that has been extensively studied and proven to possess qualities needed in an effective biological control agent for the control of invasive knotweed species. A four-year study in England and Wales, where the insect is already used, found that the insects limited the growth of knotweed (<https://www.cabi.org/japaneseknotweedalliance/>). However, it is necessary to carefully check its possible impacts on the Italian natural environment before inserting it.

In Trentino Alto Adige there are also some rare cases of use of the plant for human benefit. Sofia Panizza is the owner of the farm "Erbevive" located in Val di Sole. She has been producing body, face and hands creams using the Japanese Knotweed as the main ingredient since five years. In fact, the roots of plant contain a very high percentage of resveratrol which has antioxidant properties useful for skin care. Furthermore, Sofia has discovered anti hair loss properties of this plant and she uses it also for the preparation of shampoo. Sofia collects the roots of plants of three years during spring. Her clients do not know Japanese knotweed and its properties, and she always combines it with well known plants as marigold, camomille, edelweiss and mauve. In the Rendena valley there are also some cases of beekeepers who produce honey with Japanese knotweed's flowers. Some years, given the great concentration of this plant in the area, it is also possible to produce monofloral honey. This phenomenon is now widespread in America, where it is often possible to

find it sold as "bamboo honey" especially on the east coast (<https://honeybeesuite.com/knotty-but-nice-for-bees/>). Many american beekeepers also use the hollow stems as native bee habitat. The stems diameters vary just enough to provide suitable housing for a wide range of tunneling-nesting bees, including mason bees and leafcutters.

As described, the situation in Trentino Alto Adige and throughout the Italian territory is complex. Although there are rare cases in which the plant is used for the human benefit, most of the local inhabitants do not have a basic knowledge about Japanese knotweed, its properties and the correct methods to limit its expansion. The only fact that seems to be known by the local population is its danger as an invasive plant. From 2016, formative moments have been organized by the "Adamello Brenta" natural park in order to inform people in charge of the eradication actions and also farmers and local inhabitants. In an environment in which the coexistence between human and Japanese Knotweed is not easy, the first steps for a more widespread awareness are being made.

EXAMPLE OF INTEGRATION WITH LOCAL CULTURE AND DIET

Even if it seems that the Japanese Knotweed is mainly perceived just as an invasive and 'must eradicate' plant, people in Europe, both in the past and today, are using it in different ways and trying to make the most out of it instead of just considering it a bad weed.

Inhabitants of UK were the first to come across this wild plant imported from the far East. Evidence of its usage there, dates back to a hundred years ago. People used to pull off the maturing flowers, pretending they were sugar, chew the stem or smoke them. Back in that time people used to call Japanese knotweed wild rhubarb as it grew in huge spreading clumps alongside rivers. They used to eat it on a daily basis snapping the stem and eating the flesh on the inside by running their teeth up it. As the plant tastes like rhubarb, hence their name for it. If thirsty, people would have eaten the fleshy innards of the stem as it is refreshing. "I don't remember anyone ever being ill from eating it" reports a woman.

But not only decades ago the plant used to be eaten, today also great chefs inserted it into their daily menus.

Plant expert Dr Paul Beckett focused his attention on the Japanese Knotweed since the early 90's. After years spent in studying the plant he has found a way of getting rid of the gardeners' nightmare Japanese Knotweed: eat it. Dr Beckett has discovered it is rather tasty and has persuaded the Terre a Terre restaurant near his Brighton home to serve a series of knotweed dishes. The chef came up with several recipes including knotweed and shallot jelly, served with Sussex Slipcote cheese on an oatcake and knotweed compote; knotweed with ginger, raspberries, sugar and vanilla.

Besides, Dr Beckett served up a knotweed crumble to guests at a dinner party and asked them how was it and to guess what it was made from. They all said it was delicious and surely made with rhubarb. After this episode Dr Beckett stated: "I understand why people hate it: once you have it in your garden, it's a nightmare to get rid of. But by eating it, I hope one day we can learn to live in harmony with it."

Bun Lai is the chef at Miya's Sushi, a restaurant just a few miles from Long Island Sound. His philosophy is simply to use what is available where he lives: "Often what we find now are invasive species -- unwanted plants and animals that humans have introduced to ecosystems. Our solution? Eat them" (Lai, 2013). Japanese Knotweed is one of those invasive plants Bun Lai can easily find around his restaurant, for this reason he started to collect it and introduce it into the menu of his restaurant as the main ingredient of a refreshing drink and for tempura. The drink is a blend of Japanese knotweed shoots with fresh stevia leaves, fresh kefir lime leaves and a splash of lemon juice. While for the tempura version, the tender leaves of the plant are kimchee-pickled and then fried in whole wheat batter.

Through this project is trying to convince the world that invasive species can be delicious if people get into the right mind-set.

As this plant is easy to forage, it is also possible to use it at home and easily insert it in our diet. The Japanese Knotweed is rich in vitamin A, vitamin C, resveratrol (a much-hyped antioxidant) and it also contains potassium, zinc, phosphorous, manganese (Wong, 2016). The brewer and forager Andy Hamilton inserted many recipes using this plant into his book 'Booze for free'. He claims that it can be used anytime the recipe requires rhubarb, as substitute.

The stories above are just few examples of how to deal with this plant, trying to change the perception of it from negative (just an invasive and useless specie) to

positive (a free resource of food and a substitute for other vegetable less easy to find in our country or around us).

CONCLUSION

The Japanese knotweed is a perfect example of how past cultures, traditions and knowledge influence the relationship between human and nature. Italy, like many countries of Europe, should take the opportunity to learn from Japan in order to build a new coexistence with this plant based on the respect and on the knowledge. This is increasingly difficult in a world where fewer and fewer people are interested in dealing with similar issues, but it is extremely important to protect this precious ancient knowledge and to learn from it. As long as we look at Japanese knotweed only as an invasive plant we will never be able to find a suitable solution. In conclusion, it is always important to remember that we are the most dangerous invasive beings on this planet and it is our duty to find a meeting point with all other living beings in order to preserve the planet and our very existence.

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