Suburban Residents' Psychological Ownership of Ethnobotanical Plants Found in Surrounding Green Spaces: A Case Study at Matsudo City's Nogikuno Housing Complex, Chiba Prefecture, Japan

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Abstract

This research studied the psychological ownership (PO) of ethnobotanical (ETB) plants found near suburban residents' homes. A mixed methods study was done using site survey, aerial photographs, historical research, interviews, and questionnaire responses. Inquiries regarding recognition, usage, and hopes for increase of 12 selected ETB plants were asked. Results showed the closest relationship of recognition and appreciation was due to gathering and usage. Usage of plants and remembering them also had a deep relationship with wanting to see an increase of them in the surroundings. Interest in commercially available plants and hopes for plants in the future in the surrounding neighborhood is associated with usage knowledge. Interviews confirmed that experiences with plants differ from childhood to adulthood. Children have direct and short experiences, such as picking and eating or playing immediately and observing adults' usage, whereas adults collect and use plants procedurally. Plant experiences in childhood create deeper opportunities for PO in adulthood due to associated memories. Interviews showed these are often familial or personal experiences. Results also showed that medicinality of ETBs is not well-known, and is based on cultural input rather than association with the plant itself. It was concluded that PO, and consequently interest, come from memories associated with identification and usage knowledge. Further, from the results, it is concluded that ETBs must be readily identifiable in the landscape and that encouraging experiences through events aimed at families or personal experiences could foster the PO of ETBs.

Keywords

ethnobotany, landscape, planning, edible plants, psychological ownership, traditional knowledge

1. Introduction

According to the Millennium Ecosystem Assessment, cultural heritage is in part dependent upon ecosystem services. People's day to day social experience and their resilience in the face of disaster is lowered without it ¹⁾. The dependence on the import of food and other products differs starkly to the way that people worldwide lived even 100 years ago within local eco-cultural systems ²⁾. There has been an increasing loss of traditional culture and landscape with the modern lifestyle, resulting in an array of precarious situations. One is the dependence on global agriculture during climate change ³⁾. Food supply chains have become quite complex ⁴⁾. This is illustrated by the effect of the sudden spike in food prices in the UK in 2007-08 due to international economic issues and internal decisions, that put severe pressure on the population ⁴⁻⁷⁾. Island nations like Japan and the UK, and nations with low technology levels have less resilience due to their resource limitations. In addition to these international dependencies, local losses of habitat and Ethnobotanical (ETB) Plants (plants that include traditionally used plants, heritage plants, and

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landraces that formerly supported human populations) are increasingly disappearing in the modern world. This has been recognized to aggravate the situation and reduce resilience to famine during climate change^{8,9)}. There are concerns that the lack of biodiversity in our agricultural seed bank could lead to global food insecurity due to sudden climate shifts³⁾, prompting research into how to deal with the situation, such as suggestions for saving the seeds wild relatives and those of these traditionally used ETBs¹⁰⁾. Also, although there have recently been many papers written regarding urban farming and food in cities¹¹⁾, within that genre, there is little research specifically about ETBs being used to curb the dependency on international production chains and increase local ecosystem resilience to climate change. By using ETBs in urban agriculture, two of the Sustainable Development Goals would be addressed, that of Sustainable Cities and Communities (#11) and the other being Life on Land (#15).

In developing countries, poverty spurs the growth of food in local surroundings if there is the ability to do so⁹⁾. However, in technologically advanced countries this is not the case, and that necessity for a connection with nature now appears to be far removed in the lives of urban and suburban residents. This creates a dangerous dependence on a system that could fall apart, challenging the resilience of modern technologically advanced communities, as it did for a few days during the strong earthquake in Tokyo in 2012 and the years 2007 and 2008 in the UK⁹⁾. The future is uncertain, creating uncertainty for food and medicine production and distribution long term. One way to maintain the traditions associated with plants may be to promote use¹²⁾, which cannot occur if the plants are unavailable. For example, in Tokyo, though there is a requirement for a certain percentage of native plants to be put back into the landscapes surrounding and on new buildings, what they are is up to the designers. Rhododendron can commonly be found in city parks and streetsides because beauty, maintenance, and cleanliness are desirable aspects. However, it is not an edible or physically useful plant, and creates a food desert for not only humans but also wild creatures such as birds outside its blooming season, reducing physical interaction with nature in the city. Originally in situ native plants, fungi, and seeds are removed along with the original soil during grading, reducing biodiversity and limiting the capacity of the environment to provide food and medicine for surrounding inhabitants. Thus, the responsibility for planners and landscape architects in suburban and urban regions to consider to what extent plant species and their corresponding soils are changed for sustainability purposes. Landscape architects and urban and regional planners create the surroundings and layouts of human settlements and thus are considered essential to this research. In this interdisciplinary study, definitions are based on function rather than traditional meanings. Landscape is defined in this paper as the location and surroundings of where residents live, either original (without having been graded), or new (having been graded). Also, references to Landscape here imply those landscapes containing flora and fauna around people, and as such is not only limited to being a place as is traditional in Landscape Architecture but more to a social-ecological definition in that it is a component of a complex system of life.

The paragraphs above demonstrate the complex interactions of landscape and human life, and as such the design and management of people's living spaces is crucial for the outcome of climate change and our ability to cope with it⁹⁾. This research posits questions regarding suburban residents' current relationships with ETB plants because food and medicine sources have become abstracted from people into unknown places where they are grown and prepared for retail. Though available in markets, as Pam Warhurst stated, there are "so many people who don't know a vegetable unless it's in a bit of plastic with a bit of an instruction packet on top..."¹³⁾ The plants that once were used all over Japan, and worldwide, are being forgotten,¹⁴⁾ and the traditional ways associated with them are as well. Although these culturally significant plants may be available, without associated traditional knowledge, consciousness about them is lost. This research hopes to explore the issue of whether or not this lack of awareness is actually occurring, and to what extent within a specific suburban population of a technologically advanced country.

Currently, there is a trend of obliviousness to plants, in other words, plant blindness ¹⁵⁾. However, in previous generations, people were invested in, and thus recognized plants of traditional use as necessary. This degree of consciousness toward an object is defined as psychological ownership (PO), and is composed of time invested, subject knowledge, and decision-making control in a situation (see Figure-1) ¹⁶⁾. When people experience at least one of these three things, they can find interest in something, because they feel a sense of ownership of it, even if they don't own it per se. The more of one or all of these aspects, the deeper the PO. PO can help us define our sense of self, and thus the object becomes important ¹⁷⁾. This increase in psychological importance can be referenced in Norman Holland's psychological research on the aspects of behavior that increase interest ¹⁸⁾. How this occurs with ETB can be seen in Figure-1, adapted for this paper from previous research on ETB and PO ^{19,20)}. Research in PO is longstanding in the Education and Business research fields ²¹⁻²³⁾. That being said, it applies to any situation where the psychological phenomenon is at work and has the potential for use in a much greater arena. At this point in research of PO with regard to ETB plants, PO has a qualitative value ¹⁹⁾, and is addressed likewise in this research. Here, the phenomenon of ETB plants that used to be objects of PO, but have recently lost that psychological position, is studied to clarify the current situation.

In this study, the definition of ETB is specifically how people use plants for cultural purposes and their relationship with plants in the modern setting ²⁴⁾. The study mainly targets two plant usages: food and medicine ²⁴⁾, although other uses are mentioned by interviewees. Traditional Knowledge (TK), is defined using the words of Berkes et al. (2000), as "a cumulative body of knowledge, practice, and belief, evolving

Figure-1 A diagram of how psychological ownership (PO) of ethnobotanical (ETB) plants increases. The increase in strength of PO occurs as the subject interacts with the plant on different levels of A, B and C.

by adaptive processes and handed down through generations by cultural transmission, about the relationship of living beings (including humans) with one another and with their environment.”²⁵⁾ Thus, TK in conjunction with associated botanical specimens becomes ETB. One of the reasons that ethnobotanists exert their efforts worldwide is to prevent the loss of TK in the face of modernization^{24,26,27)}. As ETB is continually evolving, there is some retention of ETB appreciation, and new culture is born through everyday life²⁴⁾. The degree to which it is occurring is the PO of ETBs. This study researches how this retention and appreciation of ETB plants is happening in Japan.

Although Japan is an economically and technologically advanced nation, it was selected as a study area because it differs from other developed nations in that the traditional rural lifestyle was commonplace until the 1940s¹⁴⁾, traditional culture is widely appreciated, and local wild plant use is still prevalent today²⁸⁾. Longstanding Japanese traditions still survive the pressures of the modern day^{14,29-32)}. Although many ETB

studies have been done in developing countries and rural areas, and some in developed countries, no research could be found about the current PO of TK and ETB in urban and suburban areas in technologically advanced countries, where people live in the highest levels of modernity, further away from needs provided by nature. Thus, this research was done to address the need within countries dependent upon the global economy that would find themselves in an unsustainable situation due to this loss of resilience^{29,33)}. In this study, we center upon a suburban area of Tokyo where urbanization occurred rapidly from agricultural land, to survey how the TK of ETB has changed over time. For that a mixed methods case study was conducted (Figure-2), selecting The Nogikuno Housing Complex in Matsudo city using ETB and historical information provided by nearby neighborhood residents as well as by studying historical maps and aerial photographs. It is a housing development originating from former suburban agricultural and green area, but still retains some of the original landscapes in unbuilt spaces surrounding the housing complex (Figure-3).

The research was an adaptation based on flow described in Martin’s *Ethnobotany, A Methods Manual*²⁶⁾ because the study was being done first and foremost from an ethnobotanical researcher’s perspective of people’s relationship to plants. The book provides guidance on how to conduct ETB studies in human societies. Questions in the form of a questionnaire were posed to residents of the complex regarding 12 traditional ETB plants found in the nearby natural environment. Due to the current state of loss of cultural heritage throughout the world and the deep relationship of plants to TK, it was hoped that the extent to which they have been forgotten would be found and what, if anything, might give clues to preventing or reversing this loss. PO is used here as a variable of people’s feelings toward plants. Some suburbanites can connect with their food through the landscape while gardening, doing urban gardening, edible landscape, community gardens, etc. However, the current state of PO within the general population with regard to ETB

Figure-2 The Research Flow by Phases

Figure-3 Map⁽¹⁾ of Nogikuno Complex with photographed two kinds of green spaces and 12 plant locations mapped. Numbers correspond to those of the ETB plants in Table-2.

plants in their surroundings has not been defined in the literature. Also, what kinds of ETB plants Japanese suburbanites know well, and whether there is a desire to see them in the future has also not been addressed. This study was conducted with two aims in mind to find the depth of residents' relationships with plants:

- 1) To grasp the current state of PO of ETB plants in the community by investigating their recognition and general usage in the neighborhood and resident population.
- 2) To study whether there is a relationship between knowledge of ETB plants and hopes to see them in the future in the nearby surroundings.

2. Research Methods and Process

2.1 Research Structure

The landscape was investigated to select the location, for ETB significance, and for historical and environmental details. Preliminary research consisted of informal interviews with four Nogikuno Complex residents and a Japanese local ETB specialist, and over the next two years, subsequent investigation was done by site visit, interviews and walks with more residents and employees at the complex and nearby neighborhood residents. The questions were related to area history, what ETB plants they had seen, planted, or collected in the area, with documentation using photography, field notes, and audio recordings. Over 131 distinct seasonal photographs of 33 identified ETB plant species from the center of the complex in a 200 m radius were taken (See Figure-3) from 2014 through 2019. From an analysis of Phase I and Phase II results (See Figure-2), the 33 plants were whittled down to 12 for the questionnaire posed to Nogikuno Complex residents. The questionnaire results were analyzed through SPSS data entry and descriptive statistics. This was composed of frequency analysis, cross tabulation, and regression analysis in Microsoft Excel and then R-statistical software for principal component multivariate analysis of gender, age and question relationships for the 12 plants. Synthesis with the interviews in conjunction with the statistical analysis of the questionnaire produced the final results.

Informal interviews were conducted over 3 years between 2014 and 2018 (See Figure-2). They consisted of documentation using field notes and/or audio recording. Residents gave initial information regarding ETB perception, awareness, and hopes, as well as historical information regarding the research location. Interviewee responses aided in plant selection for the questionnaire as well as specific information regarding current PO (see Figure-1). Location observation of residents and neighbors, as well as ETB plant

management, fluctuation through destruction and growth, lack of usage, existence and seasonal changes were documented through photographs and field notes over the same period.

Questionnaires were distributed two per occupied mailbox in the complex to obtain quantitative results for juxtaposition and synthesis with the other data. A total of 662 questionnaire sets were distributed, and 111 were returned (16.8%), of those 103 questionnaires all of the answers were completely filled in and thus considered valid for analysis not involving age or gender. However one was missing gender, one was missing age, and one was missing both age and gender. Thus 101 of those were used in analyses involving age or gender (see Table-1). Aid by the local community leader encouraged residents and helped with distribution and collection in December 2016.

2.2 Questions Regarding ETB Plants

The following statements about plants were at the top of a table in the survey and could be matched to rows with plant pictures and names below them.

1. I've seen it.
2. It is edible.
3. It is medicinal.
4. I have gathered and used it.
5. I want to see more of it growing near my home.

These statements were to elicit increasingly intimate knowledge, then experience, and finally in the fifth, feelings of the plant in question as corresponds to the increase in intensity of PO of ETBs in previous research (See Figure-1). The survey, in Japanese, English, and Chinese, was linguistically reviewed by native speakers prior to distribution. Also, basic information questions included those of age, gender, and years living at the complex.

3. Results

3.1 Selected Ethnobotanical Plants

A list of the plants with names and the most prevalent usage is in Table-2 ³⁴⁾. In this paper they are referred to by their common Japanese name in Roman Letters according to ETB protocol ³⁵⁾, but in Table-2, names are in all three forms of the Japanese Language, in addition to one meaning per plant. Effort was made to translate these names to convey the cultural connotations behind them ²⁶⁾. Because an adequate printed source was not found, using the Google search engine in August and September 2017, a name meaning was referenced if two or more websites listed it ³⁶⁻³⁹⁾. Some name meanings are for common names and may have more definitions than listed. All of the plants are edible and medicinal, their most common uses listed in Table-2. Species selection was made through triangulation methods ³⁹⁾ consisting of: ETBs mentioned by a botanical specialist (*TN, see in Table-3) in the field in Matsudo; historical and local market availability at the two supermarkets and traditional city market within 500m (M.M., C.I., and N.I.); and neighborhood interview results. For simplicity and according to the following preliminary results, 12 out of the original 33 species in green spaces in a 200 m radius from the approximate center of The Nogikuno

Table-1 Age & Gender Dist.

Age Group		
	Count/103	Percent
20s	3	2.9
30s	4	3.9
40s	9	8.7
50s	12	11.7
60s	33	32
70s	29	28.2
80s	11	10.7
Total	101	98.1
missing	2	1.9
Total	103	100
Gender		
	Count/103	Percent
Female	63	61.2
Male	38	36.9
Total	101	98.1
Missing	2	1.9
Total	103	100

Table-2 Selected List of Ethnobotanical Plants

	Kanji Name	Katakana Name	Japanese Name (Romaji)	Meaning of Japanese Name	English Name	Family Name	Genus, Species	Basic Usage(s)	Common Use in Detail
1	山芋	ヤマイモ / ムカゴ	Yamaimo / Mukago	Mountain potato	Propagule of Yamaimo	Discoreaceae	<i>Dioscorea</i>	Food	As a side dish, vegetable, or in rice
2	山葡萄	ヤマブドウ	Yamabudo	Mountain grape	Japanese Wild Grape	Vitaceae	<i>Vitis coignetiae</i>	Food	Fruit
3	無花果	イチジク	Ichijiku	No flower fruit	Fig	Moraceae	<i>Ficus carica</i>	Food	Fruit
4	琵琶	ビワ	Biwa	An instrument of the same shape	Loquat	Rosaceae	<i>Eriobotrya japonica</i>	Food, medicine	Fruit, med. tincture of leaves
5	団栗	ドングリ	Donguri	Twisting (top)/ Starch (from nut)	Japanese Stone-oak / Beech	Fagaceae / Quercus	<i>Lithocarpus / Castanopsis</i>	Food, toy	Flour, roasted snack, tops (toy)
6	野苺	ノイチゴ	Noichigo	Field strawberry	Wild strawberry	Rosoideae	<i>Rubus ssp.</i>	Food	Fruit, flower arrangement
7	滑莧	スベリヒユ	Suberihyu	Slippery (slimy)	Purslane	Portulacaceae	<i>Portulaca oleracea</i>	Food	Vegetable raw and cooked
8	木通	アケビ	Akebi	“Through wood” or “Opening fruit”	Akebia	Lardizabalaceae	<i>Akebia quinata</i>	Food, medicine, crafts	Fruit, vegetable, household items
9	銀杏	ギンナン	Ginnan	Silver apricot	Ginkgo	Ginkgoaceae	<i>Ginkgo biloba</i>	Food	Flavoring nut
10	野蒜	ノビル	Nobiru	‘hirihiri’ spiciness like onions	Wild Asian Onion	Amaryllidaceae	<i>Allium macrostemon</i>	Food	Flavoring vegetable
11	蓬	ヨモギ	Yomogi	Grass that burns or grows well	Mugwort	Asteraceae	<i>Artemisia indica</i> var. <i>Maximowiczii</i>	Food, medicine	Used in confections, Moxibustion, meds
12	雪ノ下	ユキノシタ	Yukinoshita	Under the snow	Wandering Jew	Saxifragaceae	<i>Saxifraga stolonifera</i>	Food, medicine	Cooked vegetable, medicines

Housing Complex (Figure-3), were selected. The twelve species can be found in China and Japan, thus it was hoped that Chinese immigrants (who were numerous, according to the neighborhood council) might also be able to identify them. Interviewees did not know how to differentiate species and some genera, so overlap of same-genus or similar plants was avoided, except in the case of *Donguri* (acorns), in which the genera were all grouped into one by the single common name. In an effort to produce clear results, the number of plants was limited to those mentioned in interviews, found commercially nearby, and/or being particularly abundant or weedy plants in the area. Species were labeled according to local common names. To facilitate responses, clear photographs, one local and one from the internet were included for all but one plant.

One novel aspect of this research was the use of an ETB plant as a premeditated zero to serve as a control element. While outliers are generally considered problematic to research and analysis ⁴⁰⁾, in this research one plant was selected to be the outlier or zero for the statistical analysis – one that it was understood respondents would probably not know. It was used to validate the selection of the other plants. Not all 12 plants are commonly known to be medicinal or edible, but they are widely known or seen plants. In this research, *Portulaca*, was included as an outlier / control / zero, expected to have a low response rate, because, though commonly eaten elsewhere and locally ubiquitous, it is not usually eaten in this area of Japan, and no interviewee, though some had seen it, could name it or its usage. It was included to test the other plants’ results against it, adding weight to their selection and increasing the depth of correlational analysis by adding a true zero for the respondent population.

3.2 Research Area Landscape

The research area was selected as an average suburban area near a large metropolis with unique possibilities for biodiversity. Nogikuno Danchi is a housing development complex of 746 units in Matsudo City, Chiba Prefecture, Japan. It was built in 1975, at the beginning of a period of increasing immigration to the Tokyo Metropolitan Area from the countryside, where people have settled in its suburbs over the past 50 years. In the 1970s, many housing complexes were built in the Chiba, Saitama and Kanagawa Prefectures

surrounding Tokyo. They have green space around them, and within them, however, many were constructed in homogenous landscapes, such as marshland and agricultural land. Speaking with five long-time neighborhood residents (Table-3), it was found that the Nogikuno Housing Complex area and the neighboring Nambu Market, were built in a particularly biodiverse area. 50 to 60 years ago it was a rather large pond surrounded by marshland plants such as cattails, sometimes partially a rice paddy in the lower area, and was a resting place for migratory birds, surrounded by a forest leading up to the ridge, beyond which lay grazing pastureland and horse-training grounds. Earlier, in the Jomon Period, as can be found in various plaques in the nearby neighborhoods, people lived on the higher ridges where pottery and seashell remains were discovered less than 30 years ago. One interviewee, *W1, now almost 60, said, “My mother said to stay away... I was about ten... I wanted to cross, but it was hard... there were many plants and a forest on the other side... it was an adventure... for me, it was like the Amazon”. He would have been crossing to what is the (+) at the center of the Complex in Figure-3. Currently, an underground watershed begins under the complex and the nearby Nambu Market, covered by roads and buildings, and turns into a narrow concrete-covered river (a paved way), meandering toward the Edo River. At the beginning of this study, several green spaces surrounded the complex, unfenced, unmaintained and still rich with easily accessible and visible native plant diversity from the street. By comparing aerial photographs and the Meiji Era map on the HABS⁽²⁾ website, it was found that these areas had evaded grading and preserved their original landscape features (Figure-3). In these areas, there is much greater native plant diversity. Therefore, while being average in the type of complex, it was selected from among the housing complexes in these prefectures as an unusually good location with accessible native plant diversity by the roadside where citizens living nearby might have had the opportunity to notice them in their wild habitats.

That being said, Matsudo is in continuous development, as are many suburban areas of Tokyo due to increased urbanization. Over the three years of this study, six nearby former unbuilt areas have been developed, and all of the ungraded spaces surrounding the complex have undergone severe pruning, removing plants and destroying the ungraded landscape ecosystems that existed in the NE and SW (See Figure-3). One interviewee stated that florists come to collect the native multicolored ombré foliage from Rubus bushes that can be found in the nearby original, ungraded landscapes. However, in the adjacent ungraded areas NE of Nogikuno Danchi, Rubus, Vitis, and other plants were mowed down on one of the ungraded properties in the second year to control overgrown Sasa, and the growth has not returned to the point of flowering or fruiting. The unbuilt, ungraded location across the street, was heavily pruned and mowed along the road in 2019, removing shrubs and trees that had been accessible the previous years. On the Southwest area where the ungraded area had been, the edge lot (about ¼ of the length) was mowed down and trees cut for maintenance in winter of 2017, and the former rich diversity of plants has not returned as of spring 2019.

3.3 The Significance of Demographics

The questionnaire was distributed to the entire residential population of the complex, and a total of 111 responses were returned, 103 of these valid. Only one was answered by a foreigner (Chinese), though 10% of the resident population is foreign (information provided by the housing complex council). Of the valid questionnaires, 63 (61.2%) were female, 38 (36.9%) were male, and for two questionnaires gender was not answered (Table-1). In comparison with the Nogikuno neighborhood population, which has only had a difference of 67 more females than males out of 1,243 people as of September 30, 2017, according to the city website⁽³⁾. Most of the questionnaire and interview respondents were above the age of 60 and gave the most answers to each section (See Table-3). The majority of the questionnaire respondents were between the ages of 60 and 80, although many below that age also responded and the youngest was 21 years old. Two respondents did not answer their age. 60.2% of respondents (62 people) were in their 60s and 70s, with 27.2% below and 10.7% respondents above that age group. Because there were only three respondents

Table-3 Overview of Methods: Questionnaires returned (111/662), Interviews (39 total), Observation and Documentation (F= female, M=male) (*_ = Interviewee ID marker)

Interviews				
Dates	Interviewees	No.	Age Group	Key Results
11/2014	Resident *A (F) & Onsite groundkeeper *B (F)	2	60s-80s	Resident’s husband had planted loquat and persimmon 9 years before on site. Both women picked ripe fruit and hoped for more fruit trees.
3/2015 – 9/2016	Local Plant Specialist *NT (1M)	1	70s	Local edible and medicinal plants. Additions and verifications.
8/2015 – 9/2017	Neighborhood residents *K, *H1, *H2 (2 F, 1 M)	3	60s-80s	Neighborhood residents, two with over 60 years in area: gave local history.
8/2015, 8/2016	Local farmers *S, *S2, *ShT, *ShT2 (3 M, 1 F)	4	50s-60s	Responded to questions regarding native plants, Portulaca, and vegetables.
4/2016	Neighborhood Residents *C, *D (1M adult, 1F teenager)	2	60s, 10s	Interested but could not respond to questions about plants in area. Knew about area decision-makers.
11/2016	Resident *T (1 M) and on-site workers *J1, *J2, *J3 (3 F)	4	50s-80s	T: local plant specialist. Others: Aware of common commercially found plants, but not of others.
8/2015 - 3/2018	Neighborhood residents *Y1, *Y2 (1 F, 1 M)	2	60s-70s	Y1 knew on property. Y2, whose family is from here, knew many, on and off property.
8/2015 – 1/2017	Neighborhood residents *Ban1, *Ban2 (1 F, 1 M)	2	30s	Not aware of wild ETBs in neighborhood, but aware of ETB on property and effect.
3/2017	Local market cooks *M1, *M2 (2 F)	2	30s-50s	Aware of (cooked with) ETBs but cannot recognize or distinguish ETBs in the field.
4/2017	Neighborhood resident *E (F)	1	70s	Aware of four fruit-bearing wild ETBs.
12/2017	Nogikuno residents: 8 children, ages 5 to 12 *Ch1~8 (3M, 5F), 3 adult *ChM1~3 (F)	11	6-10, 20s - 30s	Focused interviews about 12 plants and others. Knew Ginkgo, Artemisia, acorns. One read about acorns for food. Also knew Potentilla hebiichigo as food, and susuki (Miscanthus) as play.
5/2017 ~ 2/2018	Neighborhood residents *W1, *W2, *As (1 M, 2 F)	3	50s	Area paleontology, ETB plant awareness and usage, landscape history.
2/2018	City officials in Parks & Green Space Division *P1, *P2 (2 males)	2	20s, 30s	Not knowledgeable in the ETB uses of plants, but interested in learning more.
Observation, Field Visits & Photography				
Dates	Action	Results		
4/2014 – 12/2017	Field visits and observation of plants	Apx 50 visits; found plants, limited usage, destruction, lack of management, and ignorance of these ETBs		
2/2016 – 7/2017	Selection of ETB plants from list of 33. Help from Tetsuya Nagareo (71).	12 ETB plants were selected based on current usage and knowledge. See Table-2 for more details.		
5/2016 – 12/2017	Photography of plant life and specifically of ETBs.	Over 250 photographs of ETBs in the area.		
12/2017 – 1/2018	Aerial photographs for eight year ranges, Meiji Era map, and current map review.	Landscape changes were not made to several natural green space areas in the surroundings.		
Questionnaires				
Date	Delivered	Received	Effective	Explanation
12/2016	662 delivered / 746 units	111	103 (101)	Incomplete, non-residents, missing gender, missing age

in their 20s, and there were differences between numbers in each age group, statistical weight of means was not given to the questionnaire response numbers regarding age, as they were skewed towards the most numerous age group. The results of age were understood after dividing interviewee response groups into three age groups based on results from the interviews according to the following categories: a first generation (70s and above) of people who used or whose parents had gathered and used ETBs; a second generation (50s and 60s) of people whose grandparents had often gathered and prepared the plants or had seen ETB plants used but not used them themselves; and a third generation (40s and below) who had little knowledge due to lack of exposure to plant gathering and usage. This third generation was further divided into adults and children. Children were placed into a category of their own due to their inherently unique circumstances. No connection between age and years lived at the complex was found (with a mean of 18 years). In the Nogikuno neighborhood, the highest demographics are in their 60s (232), and 70s (228). The

Table-4 Coefficient results for gender and age (Signif. codes: ‘***’ 0.01 ‘**’ 0.05 ‘.’ 0.1 ‘ ’ 1)

Gender: Fem=0 Male=1

Age: 1= <30 2= 30s 3= 40s 4= 50s 5= 60s 6= 70s 7= 80s

glm(formula = Y1 ~ AgeGroup + Gender, family = binomial, data = data)

Estimate Std. Error z value Pr(>|z|)

Discorea – Have seen Discorea (Males responded “yes” more often)

(Intercept) -1.08644 0.81206 -1.338 0.1809

AgeGroup 0.03778 0.14562 0.259 0.7953

Gender 0.89938 0.43891 2.049 0.0405 *

Discorea – It is edible (Males responded “yes” more)

(Intercept) -0.34656 0.78593 -0.441 0.6592

AgeGroup -0.03877 0.14339 -0.270 0.7869

Gender 0.86421 0.42364 2.040 0.0414 *

Discorea – Have Gathered and Used (Males responded “yes” Slightly more)

(Intercept) -2.2425 0.9723 -2.306 0.0211 *

AgeGroup 0.1126 0.1686 0.668 0.5043

Gender 0.9384 0.5225 1.796 0.0725 .

Ficus – Want to see more in the future in the surroundings

(Females responded “yes” slightly more)

(Intercept) 0.2294 0.8497 0.270 0.7872

AgeGroup -0.1557 0.1590 -0.979 0.3275

Gender -0.9009 0.4682 -1.924 0.0543 .

Rubus – It is edible (Females responded “yes” signif. more)

(Intercept) 2.4935 0.9373 2.660 0.00781 **

AgeGroup -0.2295 0.1619 -1.417 0.15635

Gender -1.0885 0.4785 -2.275 0.02292 *

Saxifraga – Have gathered & used (Males responded “yes” slightly more)

(Intercept) -2.4459 1.0639 -2.299 0.0215 *

AgeGroup 0.0609 0.1821 0.334 0.7381

Gender 1.0864 0.6034 1.801 0.0718 .

Saxifraga – Have seen (Males responded “yes” slightly more)

(Intercept) 0.04008 0.79955 0.050 0.9600

AgeGroup 0.01313 0.14692 0.089 0.9288

Gender 0.71175 0.42600 1.671 0.0948 .

Eryobotria – Have gathered & used (Younger respondents, under the age of 50 responded “yes” more often)

(Intercept) 1.4703 1.0014 1.468 0.1420

AgeGroup -0.3030 0.1521 -1.992 0.0464 *

Gender 0.5168 0.4625 1.117 0.2638

Donguri (Quercus, Fagus, etc.) – Have gathered & used (Younger respondents, under the age of 50 responded “yes” more often)

(Intercept) 0.8237 0.8448 0.975 0.3295

AgeGroup -0.3020 0.1592 -1.897 0.0579 .

Gender -0.7075 0.4734 -1.494 0.1351

Rubus – Want to see more in the surroundings in the future (Younger respondents, under the age of 50 responded “yes” more often)

(Intercept) 0.4121 1.0252 0.402 0.6877

AgeGroup -0.3516 0.1602 -2.194 0.0282 *

Gender -0.1268 0.4859 -0.261 0.7940

Donguri (Quercus, Fagus, etc.) – Have gathered & used (Females responded “yes” slightly more)

(Intercept) -0.4841 0.9480 -0.511 0.6096

AgeGroup -0.1108 0.1793 -0.618 0.5364

Gender -0.8861 0.5298 -1.673 0.0944 .

Portulaca – Have gathered & used (Older respondents, above the age of 50, responded “yes” more often)

(Intercept) -28.9278 2549.2376 -0.011 0.9909

AgeGroup 1.4534 0.8554 1.699 0.0893 .

Gender 17.5567 2549.2315 0.007 0.9945

Portulaca – Hope to see in the future (Males responded “yes” slightly more) (Intercept) -1.70959 1.61607 -1.058 0.2901

AgeGroup -0.08781 0.31616 -0.278 0.7812

Gender -1.97438 1.13859 -1.734 0.0829 .

questionnaires received reflect this. Also, according to page 10 of the Matsudo City Population Booklet 3, in 2015, the highest population range was in their early 40s, dissimilar to the neighborhood. However, the neighborhood, and respondents’ high age demographic corresponds to the countrywide higher demographic, as Japan has a “super aging population” and according to the National Bureau of Statistics, 33% of the population is over the age of 60. As for gender demographics, in comparison with the Nogikuno neighborhood population, which has only 67 more females than males as of September 30, 2017, there is no data available on the number of females in the complex, which comprises over half of the neighborhood numbers. However, approximately 1/3 more questionnaire respondents were female, resulting in possibly skewed data towards this gender. Of questionnaire respondents, according to multivariate analysis in R as shown in Table-4, it can be seen that while male respondents had more experience and interest in starchy or leaf plants, females were more apt to respond to berries and fruit, as well as *Donguri*. As for responses connected to age, it was interesting to note that younger respondents tended to say they had gathered and used *Eriobotria* and *Donguri*, and were also the most keen on seeing *Rubus* in the future in the surroundings. Finally, the results of *Portulaca* were interesting in that, although the response numbers to this plant were

very low, those above the age of 50 were more likely to have gathered and used it and males hoped to see it in the future in the surroundings (See Tables 4, 5 and 6).

Ages of interviewees were varied. Interviews (See Table-3) included eight children of ages five to twelve (*Ch1~8), with more observing the interviews, who could not respond due to lack of knowledge. Increase in child age not surprisingly showed increased ability to respond, and more sophisticated reasoning. However, while female children were able to recall different plants, male children in this group tended to romp about, or ask random questions and were not able to give plant knowledge information. Three mothers in their 20s and 30s were also interviewed (*ChM1~3), as were ladies of various ages working in the complex (*J1~4). There were mixed results, as two mothers (one of whom, *ChM3, was Chinese and recognized *Vitis* and *Ginkgo* from China and in her current surroundings as well) and one worker (*J1) could identify plants and had even seen some in the neighborhood. *ChM1 knew the locations of *Rubus*, *Vitis*, and *Ginkgo* but did not recognize *Akebia*. *J1 knew about *Allium* and *Artemisia*. However, the other interviewees in this gender had little experience or associated knowledge of wild plant uses. This differs from the interview with the male over 60 (*W1) who spoke fondly of his childhood in the site neighborhood and could recollect eating and picking berries, as well as his grandmother's collection and use of *Houttuynia cordata*. He could recall *Vitis* but had not known what it was as a child. He also remembered picking different *Rubus* species and could give their common names. A male respondent in his 70s (*Y1) also remembered ETB fruits as a child, and had planted the seed of a traditional citrus in his yard, which is now as tall as the neighboring house. Another female respondent (*W2) in her 50s, was able to recall specific trees for their significance in the community or their physical value, such as shade on hot days, or feed for wild birds.

In addition to age, the occupation of interviewees was of value in assessing the information in the context of ETBs. It was noted for insight into possible affinities for certain ETBs or reasons why they might know the plants. Commonly known ETBs that were onhand were identified by the farmers, cooks, and the groundskeeper. The groundskeeper was interested in collecting *Eriobotrya*, which was fruiting at the time. The farmers were not acquainted with the use of *Portulaca*. Even after hearing of its usefulness, and the possibility of selling the plant as a vegetable, they were adamantly against adopting the uses and held clear disdain for the plant. This was plain to see at the end of summer when substantial money must have been invested to apply herbicide to an entire field nearby that had been invaded by *Portulaca*. The cooks, though they could identify the fresh "Nanakusa" (7 traditional herbs of spring) in front of them, stated that if faced with picking them outside they would not be able to differentiate them from other wild plants. However, they, as well as on-site workers and local residents showed interest in learning more about different types of ETBs. Thus, aside from the farmers, most professionals had mild to keen interest in learning about ETB uses and identification.

Modern-day children were able to give recollections of basic interaction with nature, other than picking some plants and playing with them, such as *Susuki*, tall frond-like grasses in the genus *Miscanthus*. One girl (*Ch2) had experience collecting *Artemisia* with her grandfather and making dumplings, but that was the only time a child gave a detailed account like this. She was the one who was able to provide the most responses. When asked why she knew about so many plants, first she said, "I just play" but then when later asked whether she studies them, she mentioned reading about ETB plants at school. She also responded that she knew the edible use of *Donguri*, from "a book at school."

Adult respondents had varying degrees of knowledge. Two local homeowners (*Ban1 and *Ban2) with over 30 years in the area, knew about none but the commercially available ETB plants. One landowner in her 60s (*K) whose family had been agricultural and there for over 60 years, also had little knowledge of the plants in the surroundings. Another agricultural landowner (*H1) had knowledge ranging from specific plants on his land surrounding a shrine which has been there "since the Edo Period." A couple whose family has lived there since the Edo Period (*Y1, *Y2) can name all of the plants on the list, as well as many

others, and could name different animals who come to feed on them as well. Interviewees of this age group had varying degrees of exposure to ETB plants. Residents within the complex had more interest in growing or gathering already commercially available ETB plants in their surroundings. People who had grown up in the surrounding area remembered experiencing wild plants in their daily lives with family members or picking them as children in the area but did not use them at present. This may have been related to the fact that they had experiences with the plants as children, such as picking berries for snacks, but not as adults, who focus more on gathering and harvesting for meals or storage. In rural areas, older people can possess more botanical knowledge than younger people ⁴¹⁾. One possible reason for this in a Japanese suburb is that 60 years ago Japanese citizens were just beginning to immigrate to the Kanto Area from the countryside ⁴²⁾. The WWII had ended, and the satoyama lifestyle was being abandoned for modern ways of living, in and near cities ¹⁴⁾. This supports the reasoning that people above this age would have experience with useful plants. Also, the study population is one of immigration to a suburban area, where less wild plants grow, and there is more availability of modern resources, such as supermarkets. With less exposure to plants in the wild, and more being sold in local markets, there is less of a conscious connection with the natural plant source ⁴⁾.

3.4 People's Psychological Ownership of Ethnobotanicals

3.4.1 Recognition of ETB Plants

With the aim of learning the current state of PO of ETBs in the community, one objective was to identify the number of residents who recognize the plants by name and picture, and whether they know its general usage. Descriptive statistics was done to find the range of the most and least well-known ETBs, summarized in Table-5 and detailed in Table-6. A principal component analysis was done for the five questions as well as the 12 plants to find the relational connections among them. The results are explained as follows. It was found that, as assumed, *Portulaca* is recognized very little by respondents. The most respondents knew the medicinality of *Saxifraga* but not other aspects. They also knew the medicinality of *Artemisia* and *Eriobotrya* and have more understanding of their other uses. However, overall question 3 (This plant is medicinal.) received little recognition among respondents.

As seen in Table-6, the most plants that had been seen were *Donguri* (in other words, *Fagus*,

Table-5 Descriptive statistics for Q1. "Have you seen this plant?" Highlighted are highest and lowest.

Have seen this plant:	Percent/103 respondents
<i>Discorea</i>	40.8%
<i>Vitis</i>	46.6%
<i>Ficus</i>	68.9%
<i>Eryobotria</i>	68.9%
<i>Donguri</i>	75.7%
<i>Rubus</i>	71.8%
<i>Portulaca</i>	22.3%
<i>Akebia</i>	60.2%
<i>Ginkgo</i>	74.6%
<i>Allium</i>	61.1%
<i>Artemisia</i>	71.8%
<i>Saxifraga</i>	63.1%

Table-6 Respondents who answered "yes". Highest in light gray, lowest in dark gray. Count is above percentage.

ETB Plant	Have Seen	It is Edible	It is Medicinal	Gather- ed /Used	Future hopes to see
<i>Yamaimo</i>	42	51	7	26	16
(<i>Discorea</i>)	40.78	49.51	6.80	25.24	15.53
<i>Yamabudo</i>	48	64	4	25	26
(<i>Vitis</i>)	46.60	62.14	3.88	24.27	25.24
<i>Ichijiku</i>	71	89	16	35	28
(<i>Ficus</i>)	68.93	86.41	15.53	33.98	27.18
<i>Biwa</i>	71	90	26	34	28
(<i>Eryobotria</i>)	68.93	87.38	25.24	33.01	27.18
<i>Donguri</i>	78	44	4	26	19
(<i>Quercus</i> , etc.)	75.73	42.72	3.88	25.24	18.45
<i>Noichigo</i>	74	67	6	33	28
(<i>Rubus</i>)	71.84	65.05	5.83	32.04	27.18
<i>Suberihyu</i>	23	13	3	3	5
(<i>Portulaca</i>)	22.33	12.62	2.91	2.91	4.85
<i>Akebi</i>	62	76	7	23	26
(<i>Akebia</i>)	60.19	73.79	6.80	22.33	25.24
<i>Ginnan</i>	77	90	14	47	26
(<i>Ginkgo</i>)	74.76	87.38	13.59	45.63	25.24
<i>Nobiru</i>	63	73	10	36	23
(<i>Allium</i>)	61.17	70.87	9.71	34.95	22.33
<i>Yomogi</i>	74	87	32	38	32
(<i>Artemisia</i>)	71.84	84.47	31.07	36.89	31.07
<i>Yukinoshita</i>	65	38	35	21	23
(<i>Saxifraga</i>)	63.11	36.89	33.98	20.39	22.33

Quercus, and other acorn-like producing trees) and Ginkgo, and the least seen was Portulaca. Interviews also showed that neighborhood residents recognized all but Vitis and Discorea propagules as edibles, and clearly had no knowledge associated with Portulaca. To deepen this study, in Table-6's 3-way cross tabulation, the top two highest and lowest counts were highlighted for each question. Residents did not answer whether they had seen *Donguri*. The other well-known ETB was ginkgo, a commonly eaten nut that is easily found commercially and having culturally significant yellow fall foliage. A more regular pattern can be seen in Table-6, wherein people had seen it and knew it was edible but did not believe it to be medicinal. As expected, the least known plant was Portulaca, with only 23% having even seen it, though ubiquitous. Although 12 women in their 50s and 60s had observed the plant, there were no significant numbers of people who knew it as edible.

Thus, as assumed, the results in Table-6 showed Portulaca with extremely low counts. The next two lowest counts up, and the highest two results were selected to show realistic patterns in the data for local ETB knowledge and PO. Hopes for future are all within 16 counts of each other, with results between 16-32. Gathered and used had counts within 26 counts of each other, from 21 to 47. However, regarding gathering and usage, Ginkgo had 9 counts higher than Artemisia, much higher than the rest in the 20s and mid-30s. Thus, people had experience with Ginkgo. Discorea received the lowest count of all in having been seen, even though it is in at least two places surrounding the complex. Thus, people do not know what it is. In all other areas, it also obtained a low average count, and it also earned the lowest count between the plants in hopes to see in the future. Interestingly, according to the principal component analysis, men were more likely to answer that they had seen it and it was edible, but this was just a handful.

Vitis received low results in having been seen and in medicinality. However, in interviews, there was interest in the location and usage by all interviewed, albeit with dubiousness as to whether it was indeed there by interviewees *Y1, *Y2, *K and *W1 who had not noticed the patch. For edibility, it obtained a high average questionnaire response count. For having been gathered and used, low average and hopes to see in the future were also low average. This shows that there may be a relationship between these two elements. Questionnaire respondents could not remember having seen the plant, had no relationship with the plant, and thus, did not hope to see it in the future.

Ficus gained high average results in all of the questions, demonstrating that residents had a relationship with the plant that was not deep but was perhaps significant for the desire to see in the future in the surroundings, in which it obtained a high count. Again the principal component analysis showed that men were more likely to have seen it. In interviews, only one person in the Nogikuno Complex knew the location of the plant (*T). Other interviewees in the complex could not identify it but were interested in knowing more about it.

Eriobotrya gained relatively high results in having been seen, medicinality, and having been gathered and used. It obtained the highest count in the group for edibility and also for hopes to see in the future. It is clearly a highly prized plant culturally and is also locally available commercially. Resident's interactions with the plant are frequent. Also, R's multivariate analysis showed that women appreciate Eryobotria slightly more than men.

Donguri of the Fagus, Quercus, Castanopsis and other genera are included in the word "*Donguri*." It gained the highest count for having been seen. Even in the interviews with children and mothers, it was immediately pointed out by one mother. It obtained an average to low count for having been gathered. However, its edibility, medicinality, and hopes to see in the future results were the lowest in the group of 12. This strongly shows the importance of ETB knowledge for appreciation.

Rubus received relatively high counts for having been seen and gathered. Every group of interviewees had something to comment about regarding this genus. Its edibility result was marginally high, but the hope to see in the future was one of the highest scoring. It is believed that this has to do with the commercial value of the family, and its popularity in modern culture, as well as its attractiveness to children. Interviews

showed that children place a high value on the berries. The multivariate results for Rubus (Table-4) showed that women value the plant more than men do, at a P-value of -0.02 it had an estimated coefficient of -1.08. This could also possibly be due to the effect of popular culture, as each year during Valentine's Day, strawberries are marketed towards women, and the common name in Japanese contains the word "strawberry."

It appears of value to note that the results for Ginkgo were high in all but medicinality and desire to see in the future. There are two possibilities for this. One is the smell of the seeds, and the other is that there are already many in the area.

Allium obtained average counts. It was low in having been seen, higher in edibility, low in medicinality, and results were middle ground in having been gathered as well as hopes to see in the future. Interviews with women showed that they knew the uses of the plant.

Artemisia received high results in all areas, and the highest in medicinality, gathering, and hope to see in the future. Interviews showed intergenerational TK transmission from the elderly group to the children's group. One interviewee girl, *Ch1, discussed having gathered and made traditional Japanese desserts with her grandfather, demonstrating continued importance within the family.

Although Saxifraga was highest known as a medicinal, it obtained the lowest results in having been gathered or used (though men were marginally more likely, according to principal component analysis, to have done so), as well as in medicinality, and also received a low count for a desire to see it in the future. This relationship demonstrates that although people know the medicinality of a plant unless they have direct experience with it, there is little PO. The results for these plants in Table-4 as well as the multivariate analysis and interviews show strong relationships between usage, usage knowledge, and hopes to see in the future. Without usage and TK, it is shown that there was a success, as no one could say whether it was edible, although interviewees and respondents had seen it. The plant is eaten in Northern Japan, as per interviews with people from that area (2012 Personal Interview with a woman in her 80s from Yamagata

Figure-4 Four graphs a), b), c), and d). Total response counts from questions 2-5 plotted against Q1 to test relationship using regression at a 95% confidence level $N=12$ ETB plants' questionnaire response counts.

Prefecture in Shikaka, Kyushu), but its uses are unknown here. The questionnaire responses showed this lack of knowledge in all areas, and it demonstrated usefulness as a satisfactory zero or control for the rest of the plants to be weighted against. With the low responses, but not an exact zero, a truer R was obtainable with *Portulaca* as the control. With it in the low numbers, the response relationships among other plants were clearly apparent, as can be seen in Figures 4, 5, and 6.

3.4.2 The analysis of each question

Questions 1 to 5 showed relationships of connection between each other through an analysis of the data. Whereas it was thought that there would be an increasing relationship between the questions, instead the results showed stronger relational patterns between specific questions. Statistical analysis in both SPSS and R showed that question three, regarding medicinality, was set apart from the others, indicating that medicinality was independent of other forms of PO. As seen in Figure-5, there were close relationships between Questions 2 (edibility) and 4 (gathering and usage), and between 1 (remembering the plant) and 5 (wanting to see more of the plant in the surrounding neighborhood). Figure-4 and Figure-5 show that there is indeed a strong relationship between Questions 1, 4 and 5, the R^2 values indicating that the strongest PO (see Figure-1) comes from identification and usage, and is related to a desire for the plant to grow in the surrounding neighborhood.

More specifically, to understand the current PO of ETB plants, the increasing intimacy of the questions from 1 having the least PO and 5 having the most PO, was studied by analyzing the relationships between the results for each question. The data was first analyzed through a frequency table for each plant to question (Table-4) and then analyzed to find the connection level between Question 1, about having seen, with questions 2, 3, 4, and 5 (Figure-4). Then, the culminatory relationship of Question 4 with 5 (5 having been

Figure-5 Total answers to Question 4 plotted using regression against Question 5

Figure-6 Multivariate principal component analysis plots of total responses to each question for each of the 12 plants.

planned as the highest level of PO as defined by Figure-1) was studied and the results can be seen in Figure-5. These results indicated that, indeed, there is a progression from remembering a plant, to knowing it is edible, to gathering and using it and finally to wanting to see it in the future nearby. They also showed, as in the other analyses, that medicinality has little to do with remembering the physical plant, as can be seen in Figure-4, graph b). In the frequency analysis, it produced the lowest R^2 value of 0.16 and a P-value of 0.191, Respondents who had seen the plant did not think it was medicinal. In fact, there seemed to be little association with having seen the plant, meaning that people remembered a plant was medicinal through TK alone. Edibility's $R^2=0.48$; people who had seen the plant might be aware of its edibility. Higher was a hope to see in the future, with $R^2=0.65$; if citizens had hopes to see it in the future, they were likely to have seen the plant. Highest was $R^2=0.66$, where if residents had gathered the plant, they were very likely to remember having seen it, supporting the idea of emotional and physical memories creating PO of ETBs. Finally, question 4 was tested against 5 using regression analysis to understand the psychological relationship between having gathered the plant and wanting to see it in the future (Figure-5). This revealed that there was a relationship between gathering, usage, and the desire to see it in the surroundings in the future, with an R^2 value of 0.63.

It was found that indeed, there is a relationship between collection and interest in seeing more in the surrounding neighborhood. As can be seen in Table-6, except for Ginkgo (which could be due to a variety of possibilities including scent issues, current abundance, or difficulty of preparation), every plant showed a marginal difference of $\pm 10\%$ from respondents having gathering it, to wanting to see more of it nearby in the future.

4. Discussion

4.1 Current State of Psychological Ownership

The first aim of the research was to learn the current state of perception and whether or not there is PO of ETB plants in the community by seeking the recognition of ETB plants and whether their general usage is known in the neighborhood and resident population. After selection of the 12 plants using interviewee and historical data, more interviews and a questionnaire were conducted. Most interviewees showed interest in learning more about the plants, indicating a low level of PO (See Figure-1). This research showed that residents' and interviewee's relationships with ETB plants through ETB in turn leads to PO, as can be seen in Figure-7. It was found that not many people have an in-depth knowledge of wild ETB plants, but through interviews and questionnaire data, it was discovered that the more interaction or memories they have of a plant, the more they remember it. This was both positive and negative, as interviewees with positive experiences had good memories, but those who battled the plants, such as farmers with Portulaca, had negative memories, affecting their current relationship with the plants. Perhaps the reason for this is that in their profession they must battle against the weed, creating a negative emotional connotation to it. Not unusual, the list of ETBs contains plants considered weeds. Interviewees who had positive memories of plants expressed a desire to see more of them and learn more about them in the future. This difference of positive versus negative PO is supported by previous research by Penabaz-Wiley et al. (2018) in the negative feelings of

Figure-7 Diagram of the relationship between ETB, PO and other elements in this study.

Photo-1 Photograph of *Discorea* (*Mukago*, another name for *Yamaimo* propagule), growing on *Rhododendron* (*Satsuki*), 9/2017.

modern-day Japanese people towards *Houttuynia cordata*, or *Dokudami* in the Japanese language, and how it can change into a positive relationship through Environmental Education ¹⁹⁾. However, this situation with the farmers is extreme due to the time, money and effort spent battling *Portulaca*. Because their relationship is so negative, there is a good reason that farmers would resist anything but dislike, and changing the paradigm to positive PO would probably require environmental education based in physical and emotional student-centered learning rather than factual information ¹⁹⁾, as can be seen in

Figure-1. The results from other interviews suggested that despite interest, there is not enough education nowadays of wild ETBs to suffice their identification. The quoted statement by Warhurst in the introduction¹³⁾ returns to haunt us at this point, for even the cooks who work with well-known ETB plants in the store, cannot distinguish them in the wild. According to interviews, strong experiences were found to occur in childhood, persisting as memories and resulting in mild to intense PO of ETBs. Even these 12 culturally significant plants that are within 200 m of their living space, in several places, on top of other plants and growing profusely, are unknown and unrecognized unless they have been taught or experienced.

Statistical analysis of the questionnaires revealed that there is a strong relationship between gathering and using plants and wanting to see them in the future in the surrounding neighborhood. Another strong association was found between being able to identify a plant and having either this previous experience or feeling of hope. At most 77%, and at the very least, only 23% of the resident population were aware of these plants. That being said, the most recognized plants in the study (*Ginkgo*, *Ficus*, *Eriobotrya*, and *Artemisia*) are available as fruit or in everyday products in neighborhood markets, though the plants might not be recognized growing outside in the surroundings ⁴³⁾. Residents were also able to identify *Donguri*, widely taught about in preschool and elementary school, and *Rubus*, perhaps due to the similarity of berries with high availability in local shops. The common name is also similar to highly marketed fruit nationwide.

This also supports the idea that what is commercially available may have an impact on what people recognize, but it does not mean that they can identify it growing in the wild ⁴⁾. The other plants with less market availability had lower response rates. For example, *Discorea* is a common root vegetable found in markets but the fruiting body, a propagule, is not as commonly sold. The root is a familiar food source, and the propagules can be found, albeit rarely, at local markets. It was the least seen (other than *Portulaca*), despite being located in a prominent entrance at The Nogikuno Housing Complex (Photo-1). Information about it given in interviews with residents and on-site workers was received with surprise and delight, demonstrating a lack of awareness but not of interest in the plant.

The most reliable indicator of TK transmission was found in interviews. Although interviewees took it for granted that they knew fruit in the market, identification of these same plants in the surroundings was not so easily come by. Interviewees that knew plants in the area had either grown up with them, experienced

them through communication with older generations such as *Ch2 and *W1. One reliable indicator of connection between intergenerational TK transmission was the story that *Ch2 told about having experienced TK with her family, and also being interested in reading about it at school. None of the other children spoke of this kind of experience with their family members, nor showed an active interest in learning more, demonstrating a probable relationship between familial PO and personal PO, supported by previous research in PO of ETBs, in that familial, emotional and physical experiences were heavy indicators of PO ¹⁹⁾.

Another aspect of PO was the low level of knowledge in medicinals. There is an immediate need to study medicinal plants for several reasons, including their possible future value as well as the loss of TK that is rapidly occurring ^{27,44)}. Although traditionally, shamen and doctors are knowledgeable in medicinal plants, interviews with those above the age of 70 show that there is some medicinal plant knowledge in that group. It is evident in this study that residents do not know the medicinality of plants, compared to their already low knowledge of edibles. Research has shown that efforts put forth to educate citizens can prevent loss of TK and cultural aspects, as well as being useful in emergency situations. In this case, the labeling and education of medicinal plants might prove helpful in the retention of TK as well as be of use in emergencies ^{4,8)}.

4.2 Hopes to see ETB plants in the future

The second aim was to study whether there is a relationship between knowledge of ETB plants and hopes to see them in the future in the nearby surrounding area. It was supposed that this would aid in gaining a better understanding of the future prospect for ETBs in the nearby wild in people's minds. Through interview data and regression analysis, it was found that there is a relationship between collection and wanting to see an ETB plant in one's surroundings. Several interviewees were brought up around plants for which they still had usage memories. *W1's experience with his grandmother's use of native plants and *Ch1 and *W1's walks to elementary school eating and playing with *Rubus* and *Vitis* were childhood experiences. Adult experiences with ETB plants also indicated usage, such as *M1 and *M2 at the store kitchen teaching how to cook 7 spring herbs, and *A and *B's interaction, where *A described having planted *Eriobotrya*, and *B asking if she could collect the fruit. They were interested in seeing them and enjoyed recollection of familial or personal experiences when viewing them. All of the plants available in the local market had also been picked with relatively high frequency and high popularity. Plants that people knew were edible and had seen tended to be gathered and used and they wanted to see in the future. However, plants such as *Akebia* and *Dioscorea*, which people had not seen much, received less attention. *Saxifraga*, despite having the highest count as a medicinal at 31%, was also such a plant and had a low rating for hopes to see more. Thus, ETB plants that had been gathered had more likelihood of being bought commercially, as well as having more desire to see them in the future in the surrounding landscape.

Medicinal usefulness of ETBs appears to be unrelated to the other questions, as can be seen in Figure-5 and Figure-6. This was determined to be due to culturally learned TK, rather than direct association with the actual plant. Other studies show that, while a small percentage of aging people in modern settings have extensive knowledge regarding the medicinal and edible uses of wild plants, a majority do not ⁴⁵⁾. Because of the low counts for medicinality, results regarding the desire to see plants in the future with medicinality was not clear. However, this indicated that due to sparse knowledge, there was consequently low interest in having the medicinally recognized plants in the surroundings in the future.

Other information gained from the study for this aim showed that *Donguri* were not well-known for edibility and it is suspected that as a result obtained a low rating for hope to flourish. *Portulaca*, from beginning to end received low counts. This reveals that for people to want to see plants in their surroundings, there should be some perceived usefulness and TK. This is supported by the fact that ETB plants are part of people's cultural identity, leading to attachment ⁴⁶⁾.

The questionnaire was useful in showing that there does not seem to be a great desire to see more ETB plants in the surrounding greenery, as compared to recognition. The highest R2 score was in Gathering and Usage for having seen the plant. This shows that if people have gathered and used the plant, they can recognize it more readily. This was interpreted to mean that there must be an opportunity for hands-on experience in order to retain memory leading to PO. Children have direct and short experiences, such as picking and eating or playing immediately and observing adults' usage, whereas adults collect and then use plants procedurally. The interview with *Ch1 and *Ch8, during the conversation about Rubus, they were asked about the location of the plant, where they play. The question was asked, "Where do you like to play? In weedy places where there are many different plants, or in clean, well-tended places?" *Ch8 responded, "In places where there are lots of weeds and plants... we can play." This response matched previous information regarding the wilderness that children need in their environment ⁴⁷⁾, but builds upon that with the understanding that for ETB awareness and PO to endogenously come forth, the natural environment must provide the plants. Results showed the closest relationship of recognition and appreciation was due to gathering and usage. Experience with plants as well as remembering plants also had a deep connection with wanting to see an increase of them in the surroundings. Interviews confirmed that experiences with plants differ from childhood to adulthood. Interviews indicated that plant experiences in childhood create broader opportunities for PO in adulthood due to associated memories. The questionnaire also showed a higher R2 value for gathering and recognition than for wanting to see more and recognition. Thus, both the interviews and the survey show that interaction with plants is more important than simply knowing them.

4.3 Relationship of ETB and Planning

According to the UN Sustainable Development Goals, maintaining cultural heritage (#11, Sustainable Cities and Communities) and healthy ecosystems (#15, Life on Land) are just two of 17 interconnected aims ¹⁾. Both of these can be found in the preservation and promotion of ETB plants and their usage. Urbanized areas are vulnerable to their loss due to the systematic removal of large tracts of the original landscape in favor of new landscape, destroying ecosystems from the soil up. Although there is considerable research in urban agriculture, more research needs to be done addressing ethnobotany, heritage plants, landraces, and other biocultural landscape in conjunction with Planning to respond to the Sustainable Development Goals in creating genuinely sustainable cities and to address the Millennium Ecosystem Assessment. This research goes further to say that it is not sufficient to do urban agriculture to meet the Sustainable Development Goals. If cultural preservation for Goal #11 is to be obtained, this research shows that it is necessary to make ETBs commonplace in the landscapes within and surrounding built areas. If ecological sustainability is a goal, then it is essential for these locally appreciated ETB plants, which are part of the ungraded original landscape, to exist. The findings of this study show that it is of utmost importance that ETB plants be growing in the surrounding environment, because without their existence and opportunities for gathering and usage, PO dissipates progressively with each generation of residents. In this study, children, then adults, and most of all the elderly had increasingly intense PO of the plants, which indicates that with time this PO of plants in the surroundings could completely disappear with the loss of each older generation. Thus, it is critical to address the issue now, rather than waiting, to preserve and encourage connections with nature that could be fostered by TK in the current resident population. One of the methods that are used for this is through community events combined with the detailed labeling of ETB plants ^{4,8)}. However, because ETB plants are unknowingly removed from landscapes by planners, architects, landscape architects, and their existence subsequently controlled by the maintenance crews that follow, it is vital that these groups be aware that "work as usual" is of critical influence in the matter. The unbuilt spaces in suburban areas are particularly endangered, as are large tracts of land that are being graded by developers ⁴⁸⁾. This rush to develop is clearly evident along the nearby Tsukuba Express Line, is still occurring throughout Matsudo, and is happening in other parts of the Tokyo Metropolitan Area. Without

consciousness regarding preservation of original soils and corridors of original landscape, and even former home gardens where particular species are vulnerable to land use change into housing complexes and developments, that species can be wiped out instantly, reducing the number of native ETBs in the surroundings of new housing complexes and developments. In addition, as shown in Figures 1 and 7, TK is important for PO to occur, and as thus, it was confirmed that respondents' interest comes from the PO elements of identification and usage knowledge. In sum, if living ETB plants are clearly visible and maintained, with labels and signs, and, as previous research suggests, awareness fostered through events and activities ^{4,8,49)}, ETB knowledge could increase resulting in the preservation and expansion of traditional culture. This can be done through public landscaping and maintenance of original landscapes, thus it is rural and city planners, landscape architects and architects, builders and engineers, as well as landscape maintenance crews and local people who need to know what ETB plants are essential to an area and how to maintain them. Without conscious landscape planning and maintenance, the goal of ETB landscape is dubious. In addition to landscape, activities to foster interest and education through family and community events lead to PO, and this is also best led from within the community and the local government. The ways to do this are currently being researched but are out of the scope of this paper, and there is yet much to learn in this area.

Japan's quickly disappearing landscapes, be it due to human involvement or timber overgrowth ¹⁴⁾, and their compressed loss of TK with the elderly generation ^{45,50)}, face a strong force of ignorance in the modern age. Without popular interest in those traditional plants, in short, PO, there is no will to preserve them or recognition when they are gone until it is too late. On the other hand, in other places and countries, the TK may already be gone. In these cases, it may require the investigative skills of ethnobotanists, researchers, urban planners and most of all, community residents themselves, to find what native plants may have been used for and foster education programs along with putting them back into the landscapes within and around human settlements for the future sustainability of human communities, suburbs, and cities.

5. Conclusion

In this study, we conducted mixed methods research at Nogikuno Housing Complex and in the surroundings in Tokyo Metropolitan Area's suburban Matsudo City to learn the current state of perception, PO and interest in ETB plants in the resident population. This was done using landscape analysis through historical studies, aerial photograph interpretation, 39 interviews, and a survey distributed to the entire complex resulting in 103 valid questionnaires. The first aim of the research was to learn the current state of perception and whether or not there is PO of ETB plants in the community. The results showed that regarding recognition and usage knowledge of plants, awareness of edibility increases with recognition, but that there is a weak relationship between plant identification and knowing that a plant is medicinal. Also, we found that medicinal plant knowledge was meager and appears to have little connection with recognition. Medicinality seemed to be learned culturally as TK, and not through direct association with the plant. Residents' current appreciation for ETBs is higher with plants that are easily found commercially for culinary purposes.

The second aim was to study whether there is a relationship between knowledge of ETB plants and hopes to see them in the future in the nearby surrounding area. It was hypothesized that if people could remember the ETBs in the area, they would also have a longing for them, and this was found to be true. Conversely, those who had little knowledge of them had little interest in them as well. There was a relationship between previous collection of ETB plants and hopes to see them in the future in the surrounding neighborhood, and also a similarly strong relationship of ETB plant collection with plant recognition. Plant experiences in childhood were shown to have a deep connection with adult PO of ETB plants. From these results, it can be understood that the existence of the plants in the surrounding environment means not only an interest in

seeing them in the future but also social support for having them there. If people do not recognize or appreciate ETBs, they will not care at their removal, or vouch for them to be saved. Also, they would not know how to use them in times of emergency or for the preservation of TK through cultural enrichment. The results show that there is a relationship with recognition, exposure and use to appreciation of ETB plants, and as such, the authors suggest integration of ETBs in public landscaping, and to incorporate methods such as educational signage and labels, and events using them, in order to increase appreciation of ETB plants and reestablish TK. Landscape must no longer be considered by planners and landscape architects an item on its own to be manipulated and maintained on a purely aesthetic level; it is an essential part of the underlying web connecting culture and biodiversity, and one upon which our future may depend. The findings of this research maintain that the manipulation of these systems should be done with discretion. However, the extent to which original (ungraded) landscape and its plants and soils should be maintained is out of the scope of this paper and should be researched further. It is hoped that this research can contribute to the preservation of Japan's quickly fading cultural heritage and healthy natural environment, as well as prove useful worldwide for the recognition of the importance of local plants and their possible contributions to future urban and suburban landscapes.

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Notes

- (1) Figure-3 Map obtained on 8/20/2017, using the tool available at obeattie.github.io/gmaps-radius/ based on Google Maps.
- (2) Comparisons of 8 maps between Meiji Era and 2007~Current aerial photographs accessed 01/04/2018 obtained from <http://habs.dc.affrc.go.jp>
- (3) Nogikuno Neighborhood Demographics information from Matsudo City Demographics Website downloaded 1/05/2018 from <https://www.city.matsudo.chiba.jp/profile/jinkoutoukei/jinkou/kihondaityou/nenrei-tyou.html>

References

1. Board_of_the_Millennium_Ecosystem_Assessment. Living beyond our means; Natural assets and human well-being. Statement from the Board. 2005.
2. R Woykec, P Shroff-Mehta, PC Mohan. Local Pathways to Global Development: Marking Five Years of the World Bank Indigenous Knowledge for Development Program. World Bank, Washington, DC. 2004.
3. Hannes Dempewolf, Ruth J. Eastwood, Luigi Guarino, Colin K. Khoury, Jonas V. Müller, Jane Toll. Adapting Agriculture to Climate Change: A Global Initiative to Collect, Conserve, and Use Crop Wild Relatives. *Agroecology and Sustainable Food Systems*. 2014;38(4):369-377.
4. Pam Warhurst, Joanna Dobson. Incredible! Plant veg, grow a revolution. Troubador Publishing Ltd; 2014.
5. Jenifer Piesse, Colin Thirtle. Three bubbles and a panic: An explanatory review of recent food commodity price events. *Food Policy*. 2009;34(2):119-129.

6. Gal Hochman, Deepak Rajagopal, Govinda Timilsina, David Zilberman. Quantifying the causes of the global food commodity price crisis. *Biomass and Bioenergy*. 2014;68:106-114.
7. Getaw Tadesse, Bernardina Algieri, Matthias Kalkuhl, Joachim von Braun. Drivers and triggers of international food price spikes and volatility. *Food Policy*. 2014;47:117-128.
8. Sofia M. Penabaz-Wiley, Isami Kinoshita. The Use of Ethnobotanical Landscape to Revitalize Rural Communities: Learning from Todmorden, England, Past and Present. *Journal of Environmental Information Science*. 2018;2017(2):25-36.
9. W. Neil Adger, Nick Brooks. Does global environmental change cause vulnerability to disaster? In: Pelling M, ed. *Natural Disaster and Development in a Globalising World*. Norwich, UK: Routledge 2003:35-58.
10. Mark K. J. Ooi. Seed bank persistence and climate change. *Seed Science Research*. 2012;22(S1):S53-S60.
11. Chiara Tornaghi. Critical geography of urban agriculture. *Progress in Human Geography*. 2014;38(4):551-567.
12. Margarita Paloma Cruz, Nivaldo Peroni, Ulysses Paulino Albuquerque. Knowledge, use and management of native wild edible plants from a seasonal dry forest (NE, Brazil). *Journal of Ethnobiology and Ethnomedicine*. 2013;9.
13. *How we can eat our landscapes* [Documentary]. London: TEDx Salon; 2012.
14. Gulay Cetinkaya. Challenges for the maintenance of traditional knowledge in the Satoyama and Satoumi ecosystems, Noto Peninsula, Japan. *Human Ecology Review*. 2009;16(1):27-40.
15. James H. Wandersee, Elisabeth E. Schussler. Preventing Plant Blindness. *The American Biology Teacher*. 1999;61(2):82.
16. Jon L. Pierce, Tatiana Kostova, Kurt T. Dirks. The state of psychological ownership: Integrating and extending a century of research. *Review of General Psychology*. 2003;7(1):84-107.
17. Lita Furby. Possession in Humans: An Exploratory Study of Its Meaning and Motivation. *Social Behavior and Personality: an international journal*. 1978;6(1):49-65.
18. Norman Norwood Holland. *Holland's Guide to Psychoanalytic Psychology and Literature-and-psychology*. Oxford University Press on Demand; 1990.
19. Sofia M. Penabaz-Wiley, Mitsunari Terada, Isami Kinoshita. The Psychological Ownership of Ethnobotanicals through Education. *Environment-Behaviour Proceedings J*. 2018;3(8):12-21.
20. Sofia Penabaz-Wiley, Aiko Eguchi, Isami Kinoshita. Psychological Ownership of Ethnobotany for Strengthening Social-Ecological Systems. *The Architectural Institute of Japan's Journal of Architecture and Planning* 2019;84(759).
21. James B. Avey, Bruce J. Avolio, Craig D. Crossley, Fred Luthans. Psychological ownership: theoretical extensions, measurement and relation to work outcomes. *Journal of Organizational Behavior*. 2009;30(2):173-191.
22. Russell W. Belk. Possessions And The Extended Self. *Journal of Consumer Research*. 1988;15:139-168.
23. Lita Furby. Possession In Humans: An Exploratory Study of Its Meaning and Motivation. *Social Behavior and Personality*. 1978;6(1):49-65.
24. Richard Evans Schultes, S von Reis. *Ethnobotany: evolution of a discipline*. Portland: Timber Press, Dioscorides Press; 1995.
25. Fikret Berkes, Johan Colding, Carl Folke. Rediscovery of Traditional Ecological Knowledge As Adaptive Management. *Ecological Applications*. 2000;10(5):1251-1262.
26. G. J. Martin. *Ethnobotany: A Methods Manual*. In: Edited by WWF PaPCMV, ed: Chapman and Hall, London; 1995.
27. CM Cotton. *Ethnobotany: principles and applications*. New York; 1996.
28. Bixia Chen, Zhenmian Qiu. Consumers' Attitudes towards Edible Wild Plants: A Case Study of Noto Peninsula, Ishikawa Prefecture, Japan. *International Journal of Forestry Research*. 2012;2012:1-16.
29. Stephanie Assmann. Food Action Nippon and Slow Food Japan: The Role of Two

- Citizen Movements in the Rediscovery of Local Foodways. In: Farrer J, ed: Sophia University Institute of Comparative Culture; 2010:1-13.
30. Bixia Chen, Zhenmian Qiu, Kazuhiko Takemoto, Koji Nakamura. Utilization of Edible Wild Plants and Rural Village Development – a Case Study of Noto Peninsula, Ishikawa Prefecture. 1997.
 31. Jeniffer McDowell. Japanese Women and their Connection to the Craft Movement and Craft Production in Japan. *Lambda Alpha Journal*. 1999;29:12-28.
 32. Sasha Rabin Wallinger. Mottainai: The Fabric of Life, Lessons in Frugality from Traditional Japan. *Textile: The Journal of Cloth and Culture*. 2012;10(3):336-345.
 33. Raymond A. Jussaume, Hisano Shûji, Taniguchi Yoshimitsu. Food Safety in Modern Japan. *Japanstudien*. 2017;12(1):211-228.
 34. Shogakukan. *Chûyaku Daijiten*. Tokyo: Shogakukan; 1985.
 35. Will C. McClatchey. Exorcizing Misleading Terms from Ethnobotany. *Ethnobotany Research & Applications*. 2005;3:1-4.
 36. Tom O'Donoghue, Keith Punch. *Qualitative educational research in action: Doing and reflecting*. Routledge; 2003.
 37. Raphael Proulx, Philippe Massicotte, Marc Pepino. Googling trends in conservation biology. *Conserv Biol*. 2014;28(1):44-51.
 38. Amy Bruckman, Kurt Luther, Casey Fiesler. When Should We Use Real Names in Published Accounts of Internet Research? In: Hargittai E, Sandvig C, eds. *Digital Research Confidential*. Cambridge, MA: MIT Press; 2015:288.
 39. Todd D. Jick. Mixing Qualitative and Quantitative Methods; Triangulation in Action. *Administrative Science Quarterly*. 1979;24.
 40. Jason W Osborne, Amy Overbay. The power of outliers (and why researchers should always check for them). *Practical assessment, research & evaluation*. 2004;9(6):1-12.
 41. Flávia dos Santos Silva, Marcelo A. Ramos, Natalia Hanazaki, Ulysses P. de Albuquerque. Dynamics of traditional knowledge of medicinal plants in a rural community in the Brazilian semi-arid region. *Revista Brasileira de Farmacognosia*. 2011;21(3):382-391.
 42. Masahiko Oya, Shigeko Haruyama. Flooding and Urbanization in the Lowlands of Tokyo and Vicinity. *Natural Disaster Science*. 1987;9(2):1-21.
 43. Evert Thomas, Ina Vandebroek, Patrick Van Damm. What Works in the Field? A Comparison of Different Interviewing Methods in Ethnobotany with Special Reference to the Use of Photographs. *Economic Botany*. 2007;61(4):376-384.
 44. Plutarco Naranjo. The urgent need for the study of medicinal plants. *Ethnobotany: evolution of a discipline*. 1995;392.
 45. M. A. Signorini, M. Piredda, P. Bruschi. Plants and traditional knowledge: an ethnobotanical investigation on Monte Ortobene (Nuoro, Sardinia). *J Ethnobiol Ethnomed*. 2009;5:6.
 46. My Lien T. Nguyen. Comparison of Food Plant Knowledge Between Urban Vietnamese Living in Vietnam and in Hawai'i. *Economic Botany*. 2003;57(4):472-480.
 47. Maria Montessori. *The Discovery of the Child*. 6th ed. Milan: Fides Publishers; 1967.
 48. André Sorensen. Land readjustment and metropolitan growth: an examination of suburban land development and urban sprawl in the Tokyo metropolitan area. *Progress in Planning*. 2000;53(4):217-330.
 49. Margarita Paloma Cruz, Patrícia Muniz Medeiros, Iván Sarmiento-Combariza, Nivaldo Peroni, Ulysses Paulino Albuquerque. "I eat the manofe so it is not forgotten": local perceptions and consumption of native wild edible plants from seasonal dry forests in Brazil. *Journal of Ethnobiology and Ethnomedicine*. 2014;10(45):11.
 50. Y. Inoue, M. Umezaki. Medical Pluralism and Traditional/Complementary and Alternative Medicine Use Among Older People: a Cross-Sectional Study in a Rural Mountainous Village in Japan. *J Cross Cult Gerontol*. 2016;31(1):57-72.