



Morphological and Habitat Characteristics of *Asparagus (Asparagus officinalis L.)* and Socio-Economic Structure of Producers

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ABSTRACT

Asparagus officinalis L. (Asparagus) is a species that belongs to Liliaceae family, 300 species grow naturally on earth and 12 species of it grow naturally in Turkey. Generally, above-soil and under-soil parts of some of its different species are used as a diuretic, tonic, heart sedative, demulsan, antidiarrheal, antidiarrheal, galactagogue, aphrodisiac, antispasmodic in traditional treatment. In addition to that it is also consumed as a food. To date various pharmacological studies were conducted on many types of that species. However, no comprehensive study has been made on *Asparagus* species, including anatomical, morphological habitat and productive characteristics. In this study, morphological features of *Asparagus* as a medical aromatic plant in spreading areas, its raising environment features, economy, socio-economic status of producers, and contributions of its production on both household and local economy have been examined based on Kastamonu case. As a result, Kastamonu district has wide range with respect to climate, which helps *Asparagus* plant being cultivated in appropriate growing environments, having potential to provide opportunity to generate high earnings. But producers do not have adequate expertise to cultivate and grow it, lack of any relevant training/education, so efficiency is low and it does not have the value it deserves.

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Introduction

It has been declared that *Asparagus officinalis* L. (belonging to *Liliaceae* family) has nearly 300 homelands even though exact amount is not known and that its 100 species are naturally grown in Asia Minor and Europe and its 12 species are naturally raised in Turkey and that some of its species are under danger of extinction (Vural et al., 2000; Akan, 2014; Norup et al., 2015). It has been stated that *Asparagus* cultivation was first done by Egyptians, Greeks, and Romans, and was spread all around Europe with Roman Empire. It was used both as food and medicinal plant (Anido and Cointy, 2008; Pegiou et al., 2020). Turkey, from Mediterranean to Aegean, from Aegean to Black Sea, from high mountains to coastlines and valleys, from steppe areas to plains, has wide variety of natural habitats (Yiğit et al., 2018). Motherland of specie is Mediterranean region; species spread in mild regions, such as, South Europe, Anatolia, Asia and Africa. Its wild form is among species which are under danger of

extinction (Dezfuli et al., 2013; Sharma et al., 2018). Consumed parts of *Asparagus* which is a multi-year vegetable are its shoots. It is a vegetable that is a quite valuable gourmet product which is even named as “food of kings” or “vegetable of queens” in Europe (Alan, 2017). Among community, generally, under-earth and above-earth parts of some of its various species are being used as diuretic, tonic, heart sedative, demulsan, antidiarrhoeal, anticancer, antitumor, immune booster, aphrodisiac and antispasmodic in traditional treatment (Sharma and Bhatnagar, 2011; Sharan et al., 2011; Nishizawa et al., 2016; Singh and Geentanjali, 2016; Hasan et al., 2016; Kaska et al., 2018; Okur and Baltacıoğlu, 2018; Mfengwana and Mashele, 2019). Numerous studies were conducted on various types of species. However, anatomical studies conducted on *Asparagus* species are quite low in number. These few numbers of studies are related with cladode and root anatomy. Studies relating

with trunk anatomy were not observed. Besides it is quite difficult to classify *Asparagus* species. There are monoic, dioic, and hermaphrodite types in species. Species raising in Turkey are dioic. In order to make type diagnosis in a definite way, it is required for both individuals to be collected and examined. In general, it is not paid attention to this aspect while collecting plants, majority of herbarium samples are composed of plant parts made of cladode and trunk (Kaska et al., 2018)

Asparagus is in the *Liliaceae* family of the Magnoliophyta branch, the Liliopsida class, the Asparagales order. It is named as *Asparagus officinalis* L. in the World. White and green shoots of asparagus known to be a quite valuable gourmet product with high labor and multi years can be marketed as fresh and at the same time, it is also an industrial vegetable that can be processed as canned and frozen (Vural et al., 2000; Altıntaş, 2016). It is known that having low calorie, *Asparagus* helps liver and spleen functions to be realized with A, B1, B2, B12, C, E, K vitamins it has in its body. It is also known that Asparaginamide which it has in its body has cell repairing effect in elderly people (Seçer et al., 2006a; Patel and Patel, 2013; Al-Snafi, 2015).

Even though it was taken into cultivation in 1970s in Turkey due to the fact that it was labor-dense and costly and as its costs were high, its production and consumption could not be widespread. After 2000s, it was recorded that production was made in cities of Balıkesir, Muğla, Manisa, Eskişehir, Edirne and even Tokat (Seçer et al., 2006b; Eren, 2014). *Asparagus* production that was 68 tons in 2013, has risen to 145 in 2016 and it was 178 in 2017, whereas it was 169 in 2018 with a slight decrease and it has become 174 tons in 2019 (BUGEM, 2020). At a global scale, China ranks the first order with production of 8.3 million tons (89%) and Peru ranks in second with production of 370 thousand tons (4.3%). These two countries which are most active in the market also control trading of *Asparagus* in the World. While China ranks the first order in exporting of *Asparagus*, Peru ranks the first order with exportation of fresh *Asparagus* (Shimizu, 2006; Cannock, 2011; Pablo et al., 2014; FAO, 2020).

Asparagus is a food having high nutrition value, which is grown under *Paliurus* plant in district of Taşköprü and surrounding villages. This plant which is naturally growing in side parts of agricultural lands, provide additional income to collectors as it is sold in local markets. But if it is grown by cultivation at suitable growing environments in the region, it has a potential that could enable rural development as an important income-generating source with respect to participants involve with agriculture and animal breeding.

In this study morphological and anatomic studies will be conducted in relation to *Asparagus* species that is naturally grown in the region of Kastamonu. Within scope of anatomic studies, Epiderma, Cortex, Sclerenchyma, Parenchyma, Conduction Bundles and Core structures will be examined. Within scope of morphological studies, trunk diameter and trunk length will be determined. It was aimed to determine growing environment features, socio-economical status of producers and contributions of *Asparagus* production on household and local economy by determining spreading areas of *Asparagus* which is also defined as a medical aromatic plant in Kastamonu.

Materials and Methods

Blacksea climate dominates district of Taşköprü in Kastamonu, which is our study area (Figure 1). Summers are warm and winters are warm and there is rain in each season. Within scope of the research, it was primarily aimed to determine morphology of species with participation of various researchers from different areas of specialization. In this way, characteristics that can be used in identification of this species were determined and was revealed how the species could be discriminated from other plants. Then by getting information about growing environment features of species; habitat it prefers, requirement for moisture and, information was obtained regarding cultivation of species. With soil profiles in the area where *Asparagus* is grown and by analyzing soil samples that are taken soil structure has been determined. Furthermore, information about place of species in global and Turkish market in economic aspects, its production and economical status have been determined. Finally, by conducting face-to-face questionnaire/interview with collectors of *Asparagus* L., its socio-economic effects, contributions on household and economy with trading of this product were examined. In this way fundamental information was obtained about economic value of specie and whether it is cultivated or not.



Figure 1. Study area (Taşköprü/Kastamonu)

In this context following studies are carried out:

- With the aim to determine spreading areas in Kastamonu, its morphological characteristics and raising environment features, with the preliminary studies and by interviewing with local community, spreading areas of species were determined in the areas where species spread, individuals were examined on-site. In this way, at least part of natural spreading areas of species were determined. Furthermore, by recording growing conditions of individuals being examined (shadow situation, moisture and water situation, habitat etc.) on the report cards being prepared information about ecological requirements of species were obtained. Afterwards plant samples were taken and brought to laboratory and measurement of morphological and micromorphological characteristics were made on the samples. Morphological and micromorphological characteristics measures within project scope are as follows;

- Trunk length,
- Number of leaves on the trunk,
- Length of leaf,
- Width of leaf
- In the soils where determined individuals were grown, soil profile has been opened, soil pits opened as per depth basis in places where sample areas are selected, were dugged with a width of 80 cm, length of 100 cm and depth of 30 cm, from opened pits undisturbed soil samples were taken from depths of 0-10 cm and 10-20 cm with volume cylinders of 100 cm³. Attention has been paid to opening the mirror of the profile to be examined in the sloping land parallel to the leveling curves. The methods applied in the physical and chemical analysis of soil samples were such that the sand, dust and clay contents of soil samples in terms of texture were determined according to the Hydrometer method as reported by Bouyoucos (1951), and texture classes were determined by the international E.C. Determined according to the Tommerup triangle. Soil reaction (pH); soil reaction was measured with a glass electrode pH meter in a 1 / 2.5 ratio of soil pure water suspension. Electrical conductivity (EC) was determined from 1/2,5 soil water mixture with EC-meter (Jackson 1967). Organic substance was determined as per changed Walkley-Black wet burning method in the was specified by Jackson (1958).
- At the stage of determining economics of Asparagus, socio-economic status of producers and contributions of Asparagus production on household and local economy; by primarily making literature study, usage areas of species and its place in the economy of country have been determined. Total number of producers reached out in this study was 33, due to the availability of sampling was not taken from the mass. With integer application all producers are reached and surveyed (Özsayın et al., 2018). By using questionnaire, a face-to-face interview done with those collecting the plant, using or selling it in the region where plant and soil sample are taken, its usage form in the region and its contribution to economy of household were determined.

Results and Discussion

Results Related to Morphological Characteristics

It is recorded those 300 types of Asparagus L. (belonging to Liliaceae family) specie are raised on earth and that its 12 varieties are naturally raised in Turkey. The genus includes perennial tubers with spindle-shaped, simple or branched rhizomes, creeping, steep climbing grass or evergreen plants in the form of shrubs or the above-ground parts of which dry in winter, and the stem shows a highly branched structure. The leaves are reduced and the leaf task is carried out by special sterile thin branches called cladot. The flowers are monogamous, rarely hermaphrodite, small, main stem, branches or cladottes, and the fruit is red or black, with 1-6 seeds. Motherland of specie is Mediterranean region; species are spread in mild regions, Southern Europe, Anatolia, Asia and Africa. The specie is generally observed at the root section of Paliurus (*Paliurus spina-christi* Mill.) species that is generally named as paliurus (Deligöz et al. 2007).

Collection area of samples of Asparagus plant and general image of *Paliurus spina-christi* Mill. plant is shown in Figure 2.

Paliurus is a species with scattered crests that shed leaves in winter, can grow up to 3 meters, dense, spiny and sympodial growth. Among community it is known with local names such as Çalılıkeni, Sincandikeni, and Karadiken. Plant is seen in all areas that are droughty, stony and where forest cover is removed. It is spread in Turkey, Southern Europe, Balkans, and Caucasians (Deligöz et al. 2007).

Plant comes out from root section of paliurus plant as the spring season begins and after it matures, it contains plants that protect above-earth sections, especially after maturity, in the form of creeping, steep climber in the form of grass or bush in winter time. General trunk image of Asparagus plant is shown in Figure 3.

Numerous pharmacological studies were conducted on various types of species but studies relating with trunk anatomy were not observed. Besides, it is quite difficult to classify Asparagus specie. As part of the species, there are monoic, dioic and hermaphrodite types. The types that are raised in Turkey are dioecious. In order to make type identification in a definite way, it is required to collect and examine both individuals. As generally attention is not paid to this aspect while collecting plants, majority of herbarium samples are composed of plant sections constituted of cladode and trunk. The stoma image captured by electron microscope from the parts called cladot on the Asparagus plant is shown in Figure 4.

General image of epidermis surface of Asparagus plant is shown in Figure 5.



Figure 2. Collection area of samples of asparagus plant and general image of *Paliurus spina-christi* Mill. plant (photographed by N.Yiğit, Taşkoprü, 2018)



Figure 3. General image of Asparagus plant (photographed by N.Yiğit, Taşkoprü, 2018)

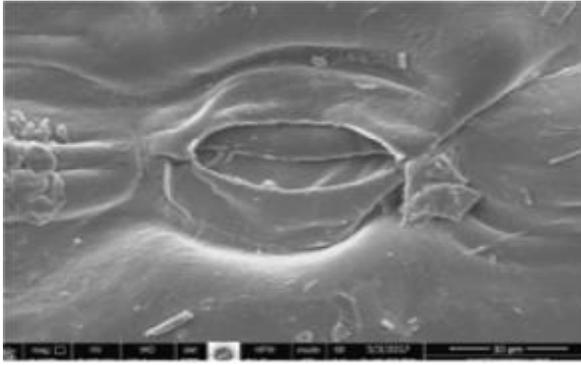


Figure 4. Stoma image of asparagus plant (Kastamonu Ünv. MERLAB, mag.8000x)

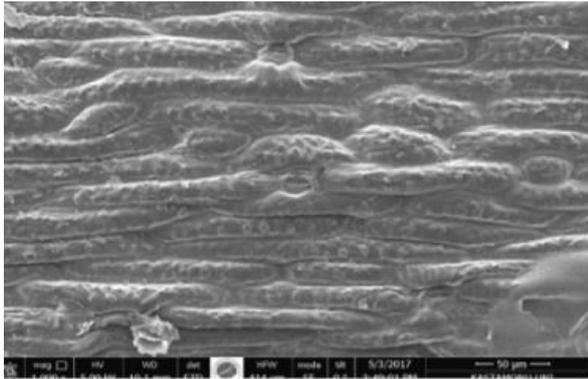


Figure 5. Epidermis surface image of asparagus plant (Kastamonu Ünv. MERLAB, mag.1000x)

When epidermis surface of Asparagus plant is generally examined it has been determined that stomata are aligned in a certain order and that they are covered with a wax structure which is quite homogeneous.

According to the species, the following layers are generally seen in the body cross sections taken 3-10 cm above the rhizome:

Epiderma: Being single rowed it consists of neatly arranged, thin or thick-walled cells covered with a thick or thin cuticle layer, being fragmented in some species. An arid type stoma was found. It is usually naked. **Cortex:** Under the epidermis, there is a parenchymal tissue consisting of 8-12 rows of cellulosic or lignified walls, generally being round cells. Some cells contain raffite bundles. **Sclerenchyma:** Starting right from bottom of cortex its width varies depending on the types. At the point where cortex ends small transmission bundles are seen within sclerenchyma. **Parenchyma:** At the bottom of sclerenchyma layer a parenchymatic tissue revealing sclerenchymatic features constituting of round cells begins. **Transmission bundles:** Within parenchymatic tissue transmission tissue bundles are generally aligned on 3-4 row circles. Transmission bundles that are more and smaller in the surrounding area are seen to be less but bigger as it is went towards interior parts. Small bundles close to epidermis are within sclerenchyma ring. In these bundles in the form of collateral bundles xylem is in U form, and in interior part there is phloem. **Core:** It is a region covering center of trunk in between big transmission bundles. It is generally composed of cellulose-walled, smooth, rounded parenchymal cells with intercellular spaces. These cells are composed of thick-walled parenchyma cells ligninized in some species.

Results Related to Habitat and Soil Characteristics

As a result of examinations made in the district of Taşköprü in Kastamonu, species grows under paliurus in open areas is among first determined raising environment data. Asparagus is not a selective vegetable with respect to climate requests. It is successfully grown in a wide geography ranging from Africa to North European countries (Vural et al., 2000). In order to have a successful Asparagus production it is required for harvesting period to pass with less rain or no rain. Because sections that are harmed during harvesting time decay during rainy weathers and cause for many plant corollas to get destroyed. When plant corolla is in deep areas of soil this enables for plant to survive under low and high temperature levels and for plant to live in a wide geography.

Within scope of investigating growing environment features of species, by obtaining information about which habitats specie prefers and its light and moisture requirements, natural raising environment of specie has been determined.

Asparagus is a plant having a wide range with respect to climatic requirements. Its tolerance is especially high with regards to warmth requirements. It is observed that it is not much affected from cold in winter months and from high temperatures in summer months. Its claw which remains under bottom part of soil does not get damaged even in extremely cold weathers. Hence, Asparagus can even be grown in regions where winter is tough. In order for shoots to be grown in the plant minimum temperature required is 10°C. Optimum (most suitable) growing temperature is at level of 18°C. Harvesting temperature levels are at levels of 15-18°C. Even when temperatures reach 35-40°C in period after harvesting this does not create any negativeness with regards to growth and development of plant. Rhizom trunk of Asparagus is durable against low temperatures (7°C) but if soil layer at the depth of 20-25 cm where rhizom trunk is placed gets frozen trunk can be harmed. In order shoots to survive, it is required for temperatures to be at level of 12°C and above. Moisture ratio should be around 75-80% and it also enjoys it if soil moisture is high. Soil moisture facilitates shoots to come out of soil surface and enables them to have brittle structure. But attention should be paid since extreme moisture would cause for shoots to get decayed.

One of the factors having most important role in growing of Asparagus is soil. Asparagus can also be raised in sandy-clayey and loamy-clayey soils. On the other hand, realizing production in heavy soils is always difficult and risky. Soils where Asparagus will be raised should not be stony and there should be no impermeable layer in the soil. Because soils with structured network have plenty of clay content and their water retention capacity is high. In heavy soils decaying of corolla and plant deaths increase significantly. Soils where Asparagus will be raised should not be stony and there should be no layer that is impermeable in the soil. Soil pH should be 6.0-6.8, base water level in soil should be 1-3 m.

According to variance analysis results (Table 1), among soils obtained from different depth layers, a difference at statistically significant level could not be found with regards to pH, electrical conductivity and organic substance ($P>0,05$).

According to correlation analysis results (Table 2), relationship level of pH, electrical conductivity and

organic substance parameters being subject to study, with each other is not statistically significant ($P>0,05$).

Results Related to Socio-Economic Structure

Even though Turkey has big chance relating with production and sales of Asparagus it could not be widespread in Turkey with the impact of problems relating with production and marketing. Apart from big plantation established in year 1997 in İzmir-Menemen by getting incentive, there is no economic production relating with it. It is declared that amount of Asparagus raised in Turkey is around 174 tons (BUGEM, 2020). In this study, we were reached to 33 producers collecting and using Asparagus plant in Kastamonu Taşköprü provincial center and villages and gaining income by selling it. There were 18 female and 15 male individuals during face-to-face interview. 18 of these individuals have stated that besides agriculture and animal breeding, they sold the products they produced at the markets and 9 of male individuals have stated that they were farmers and 6 of them stated that they were retired. Education and age group distribution of individuals interviewed are shown in Table 3.

As it is seen in Table 3, averages ages of individuals participating in questionnaire are in interval of 53-63 (12) and that with regards to education status they were mainly elementary school graduates (9). 3 participants stating that they are university graduates are retired teachers and they have stated that they collected and sold Asparagus with the aim to get additional income.

In Table 4, professions of individuals are evaluated as per their education status and individuals who are elementary school graduate housewives constitute 50%. 15 of 22 participants who are elementary school graduates are women and are housewives. They also sell Asparagus in addition to other vegetables and fruits in order to contribute to family budget.

As it is seen in Table 5, number of people living in household and income level are not directly proportionate. Number of households with highest income level came out to be group including 3-4 individuals. Agriculture and animal breeding come to the forefront as occupations constituting income sources.

When amount of lands owned by participants is reviewed, it is determined that 75% of them had land of 50 acres or more, only 10% of them did not own their land, and dealt with agriculture and animal breeding by leasing their lands (Figure 6).

When it is asked to participants about products they collected from forest or side parts of lands for their own usage or to sell them, they have stated that they collected mainly mushrooms and also Asparagus, sorrel, rosehip, nettle, and blackberry. Asparagus is locally named as kalemeşe, galemşe, snake tail, tail or creeper. Participants have stated that they have learned Asparagus from family elders with 90% and that they collected it in the region for more than 50 years. Ownership of land where Asparagus is collected is shown in Figure 7.

Table 1. Variance analysis results

		Sum of Squares	df	Mean Square	F	Sig.
Ph	Between Groups	1,584	1	1,584	2,136	0,149
	Within Groups	43,023	58	0,742		
	Total	44,607	59			
Elkilt	Between Group	2074,817	1	2074,817	0,328	0,569
	Within Groups	367008,625	58	6327,735		
	Total	369083,442	59			
OM	Between Groups	1,262	1	1,262	0,505	0,480
	Within Groups	144,760	58	2,496		
	Total	146,022	59			

Table 2. Correlation analysis results

		pH	Elkilt	OM
pH	Pearson Correlation	1	0,132	-0,109
	Sig. (2-tailed)		0,315	0,406
	N	60	60	60
EC ($\mu\text{S. cm}^{-1}$)	Pearson Correlation	0,132	1	0,249
	Sig. (2-tailed)	0,315		0,055
	N	60	60	60
OM (%)	Pearson Correlation	-0,109	0,249	1
	Sig. (2-tailed)	0,406	0,055	
	N	60	60	60

Table 3. Distribution of participants as per their age and education status

Education	Age groups				
	20-30	31-41	42-52	53-63	64+
Elementary school	1	2	7	9	3
Middle school	0	2	1	2	0
High school	1	1	1	0	0
University	0	0	1	1	1
Total	2	5	10	12	4

Table 4. Distribution of participants as per their education and professional groups

Profession	Education			
	Elementary school	Middle school	High school	University
Housewife	15	3	0	0
Farmer	7	1	1	0
Retired	0	1	2	3

Table 5. Number of people living in household and income level distribution

Number of people in household	Income level (Turkish Lira)				
	500-1500	1501-2500	2501-3500	3501-4500	4501+
1-2	1	3	2	4	0
3-4	3	4	4	3	2
5+	1	2	2	1	1

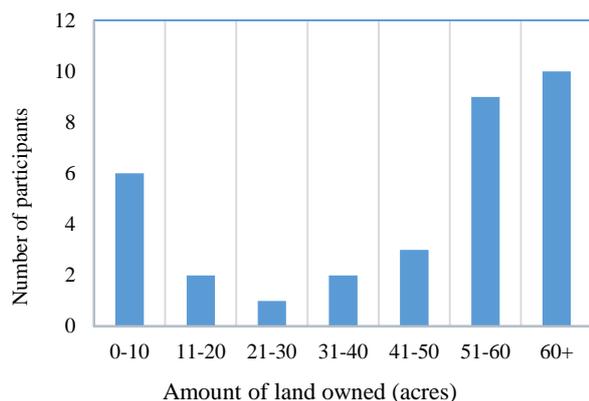


Figure 6. Amount of land owned by participants

Participants harvest Asparagus by cutting it from top section by hand or by using knife/scissors. During harvesting, attention is paid not to remove from the root so as to be able to make harvesting in the same region again and only the top section not turning into a tree are taken. Participant individuals collect 7-9 kg Asparagus on average in a week and they sell the product in their hands without waiting or they consume it for themselves. 24 out of 33 individuals participating in the questionnaire stated that they directly sold to consumer in local markets and 5 people stated that they sold it outside provincial area by means of mediator/merchant. 4 out of participant individuals have stated that they used the product they collected. Sales price of Asparagus is generally formed under free market conditions and when it is sold on wholesale basis, one bundle is (nearly 250-300 gr) is sold for 2-3 TL, whereas price of one bundle (hunch, bond) rises up to 5 TL in local markets. Asparagus can be harvested starting from month of March until end of May depending on climate/rain conditions in the region.

Harvested products are first separated from solid parts turning into tree and afterwards they are turned into bunches of 250-300 gr. To avoid them to dry, they are kept in water in places where they are offered for sale and if they are not sold, they are kept in black bags not receiving light in refrigerator. To store for a long time, they are kept in refrigerator by being frozen. 90% of participants to whom usage areas were asked have stated that they were used in eating/drinking sector and 2 participants have stated that they are used in pharmaceutical sector and 1 participant has stated that they are used in cosmetics sector.

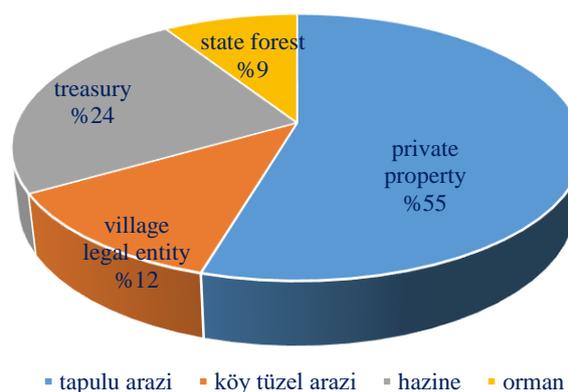


Figure 7. Ownership status of land where asparagus is collected

Participants have stated that they travelled up to a maximum distance of 2-3 km to collect the product and that many people in their villages collected Asparagus. Participants who were glad about sales price of Asparagus have stated that they did not have any problem relating with sales/marketing of product they collected. While 13 participants stated that they had cooperative membership (beet, agricultural credit, irrigation cooperative), 20 participants stated that they did not have any cooperative membership.

Discussion

Type of Asparagus having nearly three hundred varieties, that is eaten as vegetable and raised by being cultivated in some regions, having economic value is *Asparagus officinalis*. Global leader in production of Asparagus, wild parts of which are collected from nature for fresh consumption and some canned production of which is made in Marmara, Aegean and Mediterranean regions where it is produced, comes out to be China (8.3 million tons). In Turkey 174 tons of production can be made on an approximate area of 1000 decares (Korkmaz et al., 2020; Köklü et al., 2020). In this study, conducted in Kastamonu Taşköprü, it was seen that wild shoots were collected and even though soil and raising environment conditions are suitable, studies relating with cultivation were insufficient. Hence, Turkey has remained in back rows in global Asparagus production. Due to the reason that production is not made despite the fact that appropriate

raising environment is available, import from Peru and China causing foreign exchange losses.

As it is stated that producers in Kastamonu and Taşköprü, no problems are experienced in relation to marketing/sales of products brought to the local market. Due to its features regarding nutrition and health and due to consumer mass getting more and more conscious in each day, usage of Asparagus which was only consumed in some luxurious restaurants at the beginning increases and it is placed on table of people from each income group (Alan, 2017). It bears importance as being an alternative product that can be grown in various regions in Turkey with regards to agriculture and rural development. The facility is recommended in Taşköprü / Kastamonu region, as in the Aegean and Mediterranean regions, to create various product patterns and to generate income for the public. It is thought that mass production in the facilities to be established considering the habitat material and size of the habitat in various literature (Akan, 2014; Seçer et al., 2006a) will provide significant income for the people of the region. If asparagus that is harvested as fresh cannot be sold in the market it is required to be stored under appropriate conditions. As it is mentioned by Neeson (2004) in order for asparagus that is stored in deep freezer by being frozen or being canned for a long time to provide a good earning to its producer it is required for it to be harvested regularly and for supply to meet demand in a sustainable way. If production bears same quality and supply regularly meets demand, it is a product that will provide high earning to its producer.

One of the factors playing most important role in asparagus growing is soil structure. Soils where asparagus will be raised should not be stony and impermeable layer should be present in the soil. In soils with heavy content decaying of corolla and plant death incidences increase significantly. According to soil analysis done in the study area, it was determined that the area has a sandy clayey structure. In the study area soil pH is measured to be 6.8-7.8. Asparagus prefers neutral or slightly alkaline, slightly sandy and organic soils within the pH limits of 6.7-7.5. It is reported that it does not tolerate acid soils and grows well in salty soils (Seçer et al., 2006b). Seçer et al., (2006b) have stated that humus content in asparagus soil should be minimum 1% and maximum 5%. According the results of analysis conducted, it was found that organic substance amount in the study area was in between 4% and 6.8%.

Conclusion

It was determined that participants who collected and used asparagus plant in Taşköprü district and villages or who sold them in local markets and obtained additional income realized this production as they learned it from their elderly family members. However, as it has wide range with respect to climatic requirements and when it is raised by being cultivated in appropriate growing environments it is a product having potential to provide opportunity to generate high earnings. While Turkey has many advantages regarding soil, climate and raising environment in relation to production and sales of asparagus, since producers do not have adequate expertise to cultivate and raise it, as sufficient studies relating with raising are not made and relevant training is not given and

as efficiency is low it has not been given the value it deserves.

Asparagus, whose motherland is accepted to be Asia Minor by many researchers, is seen in majority of Turkey widely in wild forms. It is anticipated that there are nearly 300 wild forms in the World and that there are many varieties that are not discovered yet. Its wild forms are present in Turkey near Kastamonu, in Izmir and surrounding area, in Aydın, Muğla, Manisa and even at Van Lake basin and it is marketed together with wild herbs used as vegetable in springtime. Although western Anatolia is motherland of asparagus and it was started with production of cultivated asparagus in 70s, its production and consumption has not widespread much. Production of asparagus which is a plant that was not given the value it deserves in Turkey, has started to increase in recent years both due to demand in internal consumption and due to exportation realized by companies with foreign capital abroad. Asparagus that is known as the food of kings is a very important herbal food that was consumed by noble people as it was raised in ancient Rome. It was stated that amount of area where it is produced is nearly 1000 decares and it is recommended for this area to be increased and for it to be produced as an alternative product.

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