



Proso millet (*Panicum miliaceum* L) Cultivation Form and Potentiality under Konya Conditions, Türkiye

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ABSTRACT

Increasing climate change effect with decreasing and limitation of food sources, alternative and well adopted pathway should be used. Proso millet is one of human food alternatives, its dry environment crops. *Panicum miliaceum* is used in human and animal nutrition. Recently it has been grown in the Konya region in irrigated schemes for its grain. Proso millet grains have vital economic and nutrition potential. Previously were used to feed pet birds and poultry. Under Konya conditions, the farmer obtained about 150-200 kg/da grain yield. Crop seeds are harvested in 90-100 days, using a combined harvester. The crop possesses a vital capacity of being a promising crop that might contribute to human food security.

1. Introduction

Proso millet (*Panicum miliaceum* L.) is one of the 600 species of the millet (*Panicum*) genus in the millet subfamily (*Panicoideae*) growing in the warm and temperate regions of the world. It is an annual warm climate crop cultivated for its grain since prehistoric times. Its grains are important for humans and are used in Russia, the Near East, and India (Andrews et al 1996). Its low water requirement compared to other plants because it needs 308 liters of water to produce 1 kg of dry matter. Its grains are used as fodder in poultry and poultry farming. Although it is a delicious plant, it is not preferred by animals as green forage because the plant is covered with hairs. It is grown as a silage plant in Romania. The quality of dry grass obtained when mowing during the flowering period is usually low (Gençkan 1983; Avcioğlu et al 2009; Habiyaremye et al 2017)

2. Botanical properties

The proso millet plant is an annual warm-season grain crop, with 30-120 cm in height (Figure 1, 3, 4). The stems are coarse/ rough, woody and hollow, roundish or flat, and 6.8 mm thick at the base. The stems are

covered with hair. The stems and seed pods are yellowish or reddish-green during the seed maturity stage. The weight of a thousand seeds is 5-6 g. It is a tetraploid plant with a somatic chromosome number of $2n=36$ and the plant is self-pollinated (Gençkan 1983; Serin and Tan 2014).

3. Environmental Requirement

Panicum miliaceum can grow in an area with an annual rainfall of 500-750 mm without supplementary irrigation, and where a significant part of the precipitation falls in the summer period. It is heat resistant crops. The minimum germination temperature is 10-12 °C. Nevertheless, rapid germination and initial development require around 20 °C of temperature in this period. During the 2-3 months when the proso millet grows, it is desirable that the temperature rises above 20 °C, and the total temperature of the crop from sowing up to the harvest is 2050-2550 C (Kün 1983). There is no soil selectivity which it means the crop can be planted in each type of soil. However, it develops well on sandy loamy and clay loamy soils. The seeds are small; therefore, the cultivated soil should be well prepared, and sowing this crop should not be deeper than 2.5 cm (Gençkan 1983; Habiyaremye et al 2017).

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Figure 1
Plant general form views

4. Cultivated area and agriculture in Konya province

In a conducted study in Turkiye concluded that the crop in recent years has been preferred by the farmers and cultivated areas under expansion in Konya (Figure 2). It is very important and necessary to prepare seed-beds quite well since the seeds of the plant are small. To ensure strong germination and emergency of the seeds, it is important that the soil is smooth and free from stones. That is why it's strongly recommended intended cultivated area, the field should be plowed well before sowing. Then the disk-harrow is pulled out and the stones crash down. The crop is sowing in rows; a recommended spacing is 20-30 cm between rows. The recommended seeds to be used are 4 kg da^{-1} as seeds rate. The sowing date began from May up to mid of June. During seeding, it is suitable to apply DAP fertilizer 12 kg da^{-1} dose.

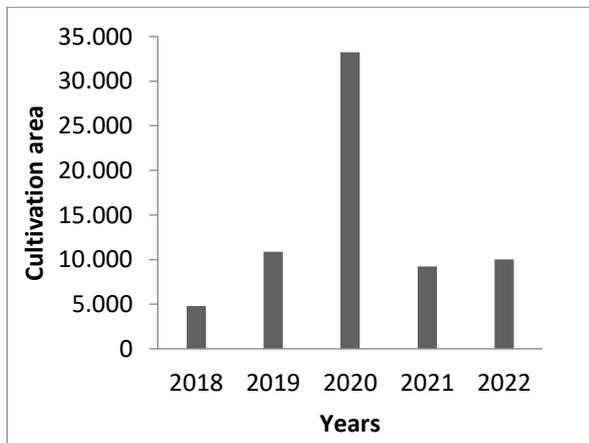


Figure 2
The cultivated areas of *Panicum miliaceum* in Konya in different years (da) Da = 1000 m^2 (Source: Ministry of Agriculture and Forestry (undated))

Irrigation is carried out by sprinkling when it is needed (usually 3 times). The first irrigation is applied in order to create a good crop growth, the second irrigation is carried out to ensure the development of the green part, and the third irrigation is irrigated during the milk production stage for grain filling and before harvest.



Figure 3
A view of field crop grown in Konya

According to climatic conditions and air temperatures forth irrigation is necessary when it's needed. However, it has been observed that irrigation is applied so many times. Meanwhile, along with irrigation, fertilizers containing urea (8 kg da^{-1}) and /or Ammonium Sulfate (15 kg da^{-1}) are preferred to be applied as upper fertilization in terms of plant development. From well seedling development up to flowering is 68 days. Between 90-100 days the seed reaches maturity. Seed harvesting can be done with a combined harvester. In Konya conditions, seed yields of $150\text{-}200 \text{ kg da}^{-1}$ have been obtained by farmers (personal communication).

5. Conclusion

In Konya, the farmers cultivated the crop only for feeding pet birds. Since there are no different varieties of millet in Konya, a single type of seed (population) is used, varieties should be obtained and different varieties and cultivation should also be tried. In addition, different production methods should be tried for high yield and quality, and for different purposes (silage, legume mixed and dry grass, etc.) should also be considered at cultivation. The consumption of grain should be diversified, such as human and animal nutrition, and industrial raw materials, as is done in different countries of the world. This increases both productions and contributes to sustainability. Moreover, there is a need for more research in different parts of both Konya and Turkey regard of cultivation techniques and adaptability.



Figure 4
A view of field crop planting in Konya

6. References

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