



Effects of traditional goat farming on forest fire control in Turkey

Ahmet Tolunay^{1,*}, Türkyay Türkoğlu²

¹ Süleyman Demirel University, Faculty of Forestry, Isparta, Turkey

² Muğla Sıtkı Koçman University, Koycegiz Vocational School, Muğla, Turkey

* Corresponding author: ahmettolunay@sdu.edu.tr

Abstract: Turkey is a country with an area of 78.004.644 hectares. This asset is 22.342.935 hectares of forest area and represents 28.6 percent of the country's area. Forest fires have an important role in threatening forests. The Mediterranean climate is on the south of the country and the Mediterranean region is the region where forest fires are most visible due to the characteristics of this climate type. Summer drought, which is one of the characteristics of the Mediterranean climate, is the most important factor in causing forest fires. When the summer drought is over, the annual plants that keep the annual life at the end are dried up after the seeds have matured. On the other hand, as a result of leaf and branch casting of trees, and shrubs, dry material that is ready for burning in forests and agricultural areas can easily accumulate and forest fires can easily come into contact with fire for any reason. In short, the presence of dry grass and woody material suitable for burning during the summer drought, and the fact that it cannot be removed from the forest areas in some way, especially because the forest fires in the Mediterranean region are both high in area and numerically high. Today, the General Directorate of Forestry is spending a large amount of money in order to prevent forest fires and to extinguish the forest fire that is needed. However, it is possible to reduce these monetary expenditures by introducing herbs and leaves to be converted into flammable material by putting small animals in forest areas in short periods at certain periods. In the prevention of forest fires, goats have important functions. Every year thousands of miles of fire safety strips and roads are set up to keep forest fires in small areas and prevent them from spreading. Passengers opened by patrons, natural fire safety path and patrol. It is expensive and difficult for mankind to open and construct these patios. By doing this, goats contribute to preventing fires. If the goats are grazed in high forest areas, it is not harmful to the forest. Because, goats eat the whole plant cover around the trees. Thus, main factors that increase the risk of fire spread are eliminated. When a fire breaks out, flames cannot spread because there are no plant remains in the ground. Thus, the fire on the scene where the adult trees are found will not be able to spread. In this lecture effects of traditional goat farming on forest fire control in Turkey were analyzed and discussed.

Keywords: Forest fires, Silvopastoral systems, Traditional goat farming, Forest fires control, Turkey

1. Introduction

Forest fires are a recurring phenomenon in, and have always had a pervasive influence on Turkish forests. In the period 2003-2013 a total of 36,724 fires burned a total of 150,100 hectares of forest land. On the other hand domestic goats are blamed for much of the destruction of the forests in Turkey. There is hardly a single study on deforestation in the Mediterranean Basin which does not specify goats as a primary cause. Over the last few years, however, it has been realized that it is not goats per se that are the real culprit but the continuous, uncontrolled overgrazing for which humans are responsible. Although uncontrolled goat grazing has contributed to the destruction of Mediterranean forests, their controlled grazing can be beneficial. The benefits may be ecological. Because of low temperatures in winter and the lack of sufficient moisture in the summer, decomposition is slow, resulting in the accumulation of organic material on the ground. This can lead to devastating wildfires. Grazing animals can reduce this material and thus prevent forest fires. In this lecture the role of goats and goat husbandry for forest conservation and wildfire control in Mediterranean and Aegean region of Turkey were analyzed and discussed.

1.1. Forest fires in Turkey

Forest fires are a recurring phenomenon in, and have always had a pervasive influence on Turkish forests. In the period 1937-1996, a total of 60,434 fires burned a total of 1,464,928 hectares of forest land. This represents 1007 fires on 24,414 hectares annually with an average area burned of 24 hectares per fire. In recent years, there has been a gradual increase in the number of fires, but due to the increased and effective use of technology in transportation, communication and fire suppression, the area burned has been cut in half and kept at a range of 12,000-14,000 ha (Mol and Kucukosmanoglu, 1997) on average. The distributions of fires to different regions are as follows: 41% of the fires occur in Aegean; 24% in Mediterranean; 22% in Marmara; and 13% in other regions (Anonymous, 1989).

In the Mediterranean and Aegean regions, every place has a unique fire regime or pattern of fire activity resulting from the interaction of many natural and cultural influences. In the past, one of the major causes of forest fires was the use of fire to clear land for agricultural purposes. Although very little effort has been made to determine the fire regime (e.g., Neyisci, 1985) in Turkish forests, many areas that are now covered by maquis formation (of mainly shrub species) were created by

repeated fires set by people. Typically, there is very little winter activity, followed by an increase in May as the rain activity decreases and fuels start to dry up, a peak in the number of fire starts in August, followed by decreasing activity in the fall. Another but less recognized fire season is the spring/fall fire season. This type of fire season is seen in the spring and fall in broad-leaved forests in fire prone regions and in the eastern Black Sea region, one before leaf-out when the last years surface fuels are dried up before the new vegetation period starts and one in the fall after the vegetation period has ended and leaves fallen. Here, surface fuels are the only fuel component that becomes available for combustion, thus all fires spread as surface fires.

The majority of forest fires in Turkey are caused by people. People-caused fires account for 98% of all fires, while lightning is responsible for the remaining 2%. Of the people-caused fires 23% was classified as arson, 27% as negligence and carelessness, and 50% as unknown (Mol and Kucukosmanoglu, 1997). "Unknown" fires are the fires for which no known cause could be determined. However, it is very likely that the shares of the first two categories of fire causes (i.e., arson, negligence and carelessness) in unknown causes are similar to that of the known causes. In this case, arson accounts for about 35% of all fires, which is a little over the average value (32 %) found in temperate forests of the northern hemisphere (Mol and Kucukosmanoglu, 1997). This is definitely a very large proportion and is seriously taken into account in the process of fire prevention, pre-suppression and suppression planning.

Arson fires are set for several reasons. About 7.7 million people live in 20 293 villages in or near forests (Anonymous, 1991). Socio-economic life standards of most of these people are well below the national average.

People with low income and low life standards see the forests as an earning ground for their sustenance. So, people set fire in the forest to create jobs that will earn them some provision or manipulate vegetation to improve and produce useful plants for their animals to graze. Personal conflicts between people and forestry officials or between shepherds or different villagers have also been reported to have been a cause for fires.

1.2. Goat and goat husbandry in Turkey

1.2.1. Traditional goat breeding in Turkey

The areas in Turkey where pure hair goat breeding is most widely conducted are the Aegean, Mediterranean and Southeast Anatolian Regions. Nomads who live in these areas have been breeding pure hair goats in the upper basins of that region for centuries (Boyazoglu et al., 2005; Ocak et.al., 2007). Pure hair goat breeding symbolizes a cultural value for nomads, in addition to being a breeding system (Guney and Darcan, 2005).

There are similarities between the borders of the regions where pure hair goats are bred and natural distribution borders of some types of trees and shrubs within the Mediterranean scrub vegetation. This similarity is demonstrated clearly in Kermes Oak (*Quercus coccifera* L.), Boz Pinal Oak (*Qercus aucheri* Jaub.&Spach.) and Holm Oak (*Quercus ilex* L.) species. These three types of shrubs are woody types, the leaves of which are eaten fondly by the pure hair goats. Pure hair goats have selected as their habitat the natural distribution area of these these shrubs. Pure hair goat raising is conducted in the form of transhumance in Turkey. Villagers are specialized in pure hair goat raising and do not avail of any other sources of income. The number of goats in the flocks ranges between 75-600. Flocks of goat are being grazed by women and children. They climb to the grazing land at the end of March and return in November. Villages have built simple accommodation facilities within the areas where they graze their pure hair goats.

The addition of male goats to the flocks for the purpose of impregnating females occurs during the month of September and they are kept within the flock for approximately 10 months. The rate of male goats/female goats is 1/25 during the breeding period. Kids are fed with their mother's milk for a period of 2 months after their birth. The milking period lasts for 3 months and the milking is performed once a day by women. The total milk yield per goat is 55 kg. A pure hair goat has a live weight of up to 20 kg at 1 year of age. The hair of the goats is only sheared once a year in August. As free range breeding is conducted, the manure of pure hair goats cannot be collected, thus it is not possible to use manure in agricultural production.

The milk and products obtained from pure hair goats are consumed by the families owning the herds and also placed in the markets of villages. The milk they obtain is converted into products such as cheese and/or butter upon being used purely or by being mixed with cattle milk. There is no marketing mechanism for providing goat milk and products to the consumers on a regular basis.

The per household income obtained from pure hair goats on an annual basis is US \$3,500. Given that the average number of members in a household is 4.9, it is seen that the annual income per capita is US \$715. As the annual income per capita is US \$9,333 in Turkey, it can be concluded that economic status of the villagers is rather bad (SPO, 2008).

1.2.2. Problems on goat breeding in Turkey

Some traditional agroforestry practices used by the inhabitants of rural areas in Turkey are not given importance by institutional and academic circles and efforts are aimed at reducing or eliminating these practices. One of these practices relates to pure hair goat (*Capra hircus* L.) breeding by forest villagers (Avci, 2005; MEFO, 2008). Various investigations have been conducted regarding grazing at in-forest meadows and forage yield in Turkey (Defne, 1955; Alpay, 1972). Furthermore, there are also studies regarding utilization of leaf fodders of forest trees (Mol, 1982; Sevimsoy and Sun, 1987). In these researches, the damage done by pure hair goats on the forest and the trees have been highlighted and they request has been made for keeping them away from forests. Yet, in the countries located in the Mediterranean Region have noticed the importance of the woody species in goat breeding and tried to develop their breeding system (Aldezabal and Garin, 2000; Boyazoglu and Morand, 2001; Ainalis and Tsiouvaras, 2004; Ainalis et al., 2006; Zarovali et al., 2007).

2. Role of goats for wildfire control in Turkey

There is hardly a single study on deforestation in the Mediterranean and Aegean region of Turkey which does not specify goats as a primary cause in Turkey. Over the last few years, however, it has been realized that it is not goats per se that are the real culprit but the continuous, uncontrolled overgrazing for which humans are responsible (Papanastasis, 2009). Although uncontrolled goat grazing has contributed to the destruction of Mediterranean forests, their controlled grazing can be beneficial (Papanastasis, 1985). The benefits may be ecological. In discussing livestock grazing in the forests, domestic animals are instrumental to the functioning of these ecosystems because they contribute to nutrient cycling and thus to an increase of their productivity (Liacos, 1980). Because of low temperatures in winter and the lack of sufficient moisture in the summer, decomposition is slow, resulting in the accumulation of organic material on the ground. This can lead to devastating wildfires. Grazing animals can reduce this material and thus prevent forest fires. The role of goat in reducing fuel has received special attention in the last few years in Turkey.

3. Conclusion

Goats play an important socio-economic role in many rural areas of the world. These animals adapt easily to intensive production systems and convert their feed into highly nutritious milk and meat very efficiently (Castel et al., 2010). Therefore, goat farming is a traditional occupation and an important activity for nomadic societies, especially in the Mediterranean region of Turkey (Tolunay et al., 2014). Goat breeders living in these areas obtain a means of subsistence by selling high value products such as meat, milk and dairy products to urban consumers. Goats need nutrients derived from grazed forage in order to enhance extensive production systems so that goats may produce high value products.

Traditional goat production is quite profitable in Turkey. The economic value of hair goat production has been ignored for a long time; whereas, this production system is the cheapest and most ecological production system so that the goats utilize the maquis and bushes where the other livestock animals could not consume. In conclusion goat grazing at the forestry and maquis areas would be useful for not just forest but the raising of goat number and production as well (Türkoğlu et al., 2016).

In Turkey, pure hair goat breeding had been conducted in an undisciplined and irregular manner until 2011. This was mainly due to the banning of pure hair goat breeding in forest areas by the state. A grazing plan was prepared by the state and conditions have changed pursuant to the government's permission of grazing goats in state forests. Thus, the number of the pure hair goats has increased dramatically in recent years. Currently, pure hair goat breeding is conducted in the form of free-range animal husbandry in scrublands. In line with these developments, it has become critical to develop a sustainable goat farming and benefitting optimally from the rich feed sources in Turkey.

References

- Ainalis, A.B., Tsiouvaras, C.N., Nastis, A.S., 2006. Effect of summer grazing on forage quality of woody and herbaceous species in a silvopastoral system in Northern Greece. *Journal of Arid Environments*, 67: 90-99.
- Ainalis, A.B., Tsiouvaras, C.N., 2004. Forage production of woody fodder species and herbaceous vegetation in a silvopastoral system in Northern Greece. *Agroforestry Systems*, 42: 1-11.
- Aldehbal, A., Garin, I., 2000. Browsing preference of feral goats (*Capra hircus* L.) in a Mediterranean mountain scrubland. *Journal of Arid Environments*, 44: 133-142.
- Anonymous, 1989. The Turkish Forestry in the 150th year of its Establishment. General Directorate of Forestry, Publication No: 673, Serial No: 30. Ankara.
- Anonymous, 1991. Report on Forestry (Orman Raporu). TUSIAD, Publication No: TUSIAD-T/91, 6.144, 57 pp.
- Alpay, O., 1972. Relation between Grazing Systems, Range Use and Animal Production on Aladağ Forest Ranges. Technical Bulletin Series No: 52, Cihan Press, Ankara, 56 pp.
- Avci, H., 2005. Forestry studies and pure hair goats. International Symposium on Forest-Goats-Erosion and Tourism, April 12-13, 2005, Adana.
- Boyazoglu, J., Morand-Fehr, P., 2001. Mediterranean dairy sheep and goat products and their quality: A critical review *Small Ruminant Research*, 40: 1-11.
- Boyazoglu, J., Hatziminaoglou, I., Morand-Fehr, P., 2005. The role of the goat in society: Past, present and perspectives for the future. *Small Ruminant Research*, 60: 13-23.
- Castel J.M., Ruiz F.A., Mena Y., Sánchez-Rodríguez M. 2010. Present situation and future perspectives for goat production systems in Spain. *Small Ruminant Research*, 89-2: 207-210.
- Defne, M., 1955. An Investigation on Forest Protection Problem through Pasture and Grazing Management in Turkey. T.C. Ziraat Vekaleti, Orman Umum Müdürlüğü Yayınları, Sıra No: 167, Sayı: 14, Yenilik Publisher, İstanbul, 124 pp.
- Güney, O. and Darcan, N., 2005. Structural condition and development perspectives of goat raising on the Mediterranean Belt. International Symposium on Forest, Goats, Erosion and Tourism, April 12-13, 2005, Adana, Turkey.
- Liacos, L., 1980. Livestock grazing in Mediterranean forests. In *Incontri internazionali: problemi della conservazione e ricostituzione della copertura forestale*. October 6-11, Palermo, Italy.
- MEFO, 2008. An Action Plan for Reducing Goat Damage. Ministry Environment and Forestry of Turkey, Ankara, 40 pp.
- Mol, T., Kucukosmanoglu, A., 1997. Forest fires in Turkey. In Proc. XI. World Forestry Congress, Antalya, Turkey.
- Neyisci, T. 1985. Historical role of fire on red pine (*Pinus brutia* Ten.) forests of Antalya Doyran region. Ormancilik Arastirma Enstitüsü Press, Technical Report No. 29, pp. 67-91.

- Ocak, S., Bahadır, B., Güney, O., 2007. Traditional Goat Raising and Rural Development. 5. National Zootechnics Science Congress, 05-08 September 2007, Yüzüncü Yıl University, Faculty of Agriculture, Van, Turkey.
- Papanastasis V.P., 1985. Integrating goats into Mediterranean forests. IX World Forestry Congress. July 01-10, Mexico City, Mexico.
- Papanastasis V.P. 2009., Restoration of degraded grazing lands through grazing management, can it work? Restoration Ecology, 17-4: 441-445.
- Sevimsoy, M. and Sun, O., 1987. Studies on the determination of the nutrimental measures of the dried oak leaves and grazes produced from the degraded coppice forests in the Eastern Region of Turkey by single econometric equation, Forestry Research Institute Publication, No: 183, Ankara, Turkey, pp. 24.
- SPO, 2007. Main Economic Indicators, Republic of Turkey. Prime Ministry. State Planning Organization, Ankara, 142 pp.
- Zarovali, M. P., Yiakoulakiand, M.D., Papanastasis, V.P., 2007. Effects of shrub encroachment on herbage production and nutritive value in semi-arid mediterranean grasslands. Grassland Forage Science, 62: 355–363.
- Tolunay A., Adıyaman E., Akyol A., Ince D., Turkoglu T., Ayhan V. 2014. An investigation on forage yield capacity of Kermes Oak (*Quercus coccifera* L.) and grazing planning of Mediterranean maquis scrublands for traditional goat farming. Scientific World Journal, Article ID 398479, 1-9.
- Türkoğlu, T., Bekiroğlu, S., Tolunay, A., 2016. Effect of Stocking Rate on Forage Availability and Growth Performance of Goat Kids in Mediterranean Kermes Oak Shrublands. Kastamonu Univ., Journal of Forestry Faculty, 16-1:269-279.