Oat (Avena sativa L.)

Several countries are exploring and implementing various novel strategies to improve the availability of range forage for livestock in order to ensure food security, economic well-being and social cohesion of people. Nevertheless, the increase in food demand and environmental pressure on soils have highlighted the urgent need to adopt more sustainable and efficient agricultural practices and technologies. These should focus on mitigating negative impacts and ensuring the long-term sustained production and efficiency of these pastures. Forages, which include a variety of crops such as grasses, legumes, and other species used for green fodder, hay, and silage, constitute the main source of livestock wealth and are fundamental to these industries. Being essential for livestock feeding by providing the necessary nutrients for growth and production, it is crucial to increase the rate of genetic improvement and conservation of forages to maintain the industry's competitiveness .

The most common grasses used as forage include forage corn, oat, wheat, barley, and rye grass, which are valued for their energy content and their ability to produce large volumes of biomass even in dry lands. Among forage grasses, *Avena sativa* stands out as a highly important temporary grass worldwide due to its remarkable adaptability to a wide range of altitudes and climates. In the Peruvian Andes, oat grows at altitudes ranging from 2500 to 4000 m above sea level and shows exceptional adaptability and high nutritional quality. Its use, either alone or in combination with other forage legumes, enriches the protein content of rangelands, increasing their value as a food resource for livestock.

Oats are a winter fodder crop. When they grow between wheat, barley, and other winter crops, they are considered weeds and are called doser. Their exact location is not known yet, but they were planted in ancient times in Central Europe. From there, their cultivation spread to Europe and all European countries, and then they moved to Turkey, and then they moved to the Americas. They are also planted to a small extent in Syria and Lebanon, and they were planted in Iraq as a fodder crop in the seventies of the last century. It is promising for multi-cut, fits well in farming systems for quality and quantity fodder supply during winter feed scarcity period (December to April). In an estimation of FAO(2010/011), oat ranked sixth in the global context of wheat, maize, rice,barley, and sorghum as a food crop and ranked first in the world within the fodder production statistics.

Distribution of oat:

Oats are mostly found at 45-65° N and 20-46° S . In temperate regions, they are grown as a spring-growing /autumn-growing and as a cool

season crop in the Mediterranean and tropical areas. Oats grow on a wide range of soils at temperatures ranging from 5 to 26°C and rainfall over 500 mm. Further, oats perform better in loam soils but tolerate acidic and low fertile soils with pH ranging from 4.5 to 8.6. Oat has become a major crop in regions such as the Himalayas (Pakistan, North India, and neighboring countries), the southern cone of South America (Argentina, Brazil, Chile, Uruguay and North Africa)

Importance and benefits:
Oats are used primarily as green fodder or for grazing by animals and can be exploited when their height is about 40 cm, as the amount of crop and nutritional value are high. Oats give two to three harvests during the season. Through research studies conducted on the oat crop, it has been proven that it gives four harvests during the season and the average production of green fodder is between 24 to 32 tons per hectare and its seed production may range between two to four tons per hectare. The nutritional value of oats is at its peak in the early stages of growth. As for the last harvests, they are cut and made into hay or silage when the plants .reach the milky stage and are stored in times of fodder scarcity

Suitable environment:
Oats are less tolerant of drought, especially in the flowering and ripening stages, and need moderate conditions for growth. Therefore, they are planted in irrigated areas or areas where the rainfall rate ranges from 375 to 425 annually. Oats are grown either alone or mixed with another crop during the period from October to mid-November. In rain-fed areas, they are grown during the autumn rainy season. They require fertile, mixed soil and a relatively long growing season compared to barley

Varieties: It is believed that cultivated oats originated from two wild species, namely the naked wild oat and the red wild oat.

Nutritional value: The nutritional value of oats varies according to the variety, cultivation method, prevailing environmental conditions, harvesting stage, soil texture, and growth stage.

Effect of growth stage on the chemical composition of oats.

Growth stage	Carbohydrates	protein	Ether Extract	Fiber	Ash
Flowering	45	8.4	1.8	32	5.3
Milk maturity	42	6.6	2.5	34	5.7
Dough maturity	48	6.1	2.9	30	5.7