PRODUCTION OF APPROPRIATE FOOD: sufficient, safe, sustainable

TEFF

Eragrostis tef [Zucc.] Trotter

1. Distribution

Teff originated and diversified in Ethiopia. It is one of the most important cereal crops in this country: it occupies about 29% of the land devoted to cereals. Many farmers grow teff as cash crop because of its higher and more stable market price. Outside Ethiopia, it was introduced into other tropical countries and traditionally it is grown in Eritrea, and to a lesser extent, in India.
In Ethiopia, teff performs well with annual rainfall of 750-850 mm and 450-550 mm during its growing season, but reasonable yield can be obtained with 300 mm during the plant cycle. It grown at altitude of 1000 to 2500 m and a mean temperature range of 10 °C to 27 °C.

2. Description

Teff is an annual grass also known as bunch grass. Culms up to 120 cm high in selected varieties, but often rise 60-100 cm (figure 1). Rooting depth differs with genotype and ranges and an average of 60-80 cm at the heading stage. Spikelets are grey or golden, 8 mm long with up to ten florets. Panicle is 18-20 cm long and can range from loose to compact. The caryopsis is 0.9-1.7 mm in length, and 0.7-1.0 mm in diameter, which is very small and its color varies from white to dark brown. Seeds are extremely small, weighing 250 to 350 mg per 1000 seeds. In Ethiopia two types are grown, one with white seeds (preferred) and one with brown seeds (figure 2).

Figure 1. Teff: panicle inflorescences and panicle bearing seeds.

3. Nutritional value and uses

Teff contains a higher amount of essential amino acids, including lysine. The total seed average protein content range from 8 to 11%, slightly higher than sorghum, maize or oats, but lower than wheat. Teff is predominantly produced as a staple food for local consumption and an important cash crop for farm households. The grain is grounded into flour to make a pancake-like local bread called *injera*. It is also appreciated as a fodder crop, with nutritious straw preferentially given to cows used for traction. Moreover, its straw is the preferred binding material for walls, bricks and household containers made of clay.

Figure 2. Tef: white and brown seeds.


UNIVERSITÀ
CATTOLICA
del Sacro Cuore


MILANO


FONDAZIONE
ROMEO ED ENRICA INVERNIZZI

4. Crop rotation

Teff is predominantly grown alone, though it is intercropped occasionally with oil crops such as rapeseed, safflower and sunflower or relay-cropped with maize and sorghum. In Ethiopia, teff is often rotated with pulses, such as field pea, faba bean, chickpea, or oil crops like linseed depending on location and the type of soil. In most cases a 4 or 5-year rotation is common: (1) pulse – (2) teff – (3) teff – (4) wheat (or barley) – (5) pulse.

5. Sowing

The common method of sowing teff is hand broadcasting. Seeds are very small, hence special care is necessary to prepare a fine and smooth seed bed. In addition, it is useful cover the seeds lightly after sowing. A seeding rate of 25-30 kg/ha (in order to obtain 2000 plant/m^2) is recommended for broadcast sowing. Sowing period in Ethiopia ranges between mid-July to early August, depending on local climate, soil type and life cycle length of the cultivar, and usually when the soil water is near field capacity.

6. Crop cycle

The fields are usually ploughed many times prior to sowing in order to control weeds and to prepare a fine seed bed for the small tef seed. Under the traditional management system, farmers start land preparation during the short rainy season from February to March. Thereafter the land is kept bare for 2–3 months with repeated tillage, and farmers plant the crop in the middle of the rainy season (July–August), which reduces the total growing period.
Emergence takes a few days after sowing (4-11 days), depending on soil moisture and temperature. Vegetative growth and canopy development follows the common pattern for other crops, as does biomass accumulation. Time to flowering ranges from about 35 to 65 days. Teff is harvested when the vegetative part turns yellow or brown. According to the maturity group of the cultivar and photoperiod, teff may be harvested between 60 and 150 days after sowing.

7. Yields and critical aspects of crop growing

The national average yields are quite low in Ethiopia, around 1 tonne/ha but accounts for about 20% of the total cereal production (in most cases second to maize).
Teff has some tolerance to frost and flooding, and to high temperatures up to 35 °C, but cannot survive at prolonged freeze. Irrigation is not commonly practiced in the traditional culture areas, though water scarcity is the major limiting factor for the growth in arid and semi-arid regions of Ethiopia because of inadequate and erratic rainfall.
It is a weak competitor with weeds because of its relatively thin, short and fragile stems. Yield loss due to weed competition is one of the most important production limiting factor. A grain yield loss in teff varying from 23 to 65% due to weed competition. Tillage is considered the main technique to reduce weed infestation and hence to reduce the need to apply herbicides.
Low yield, also, is attributed to nutrient deficiencies, mainly of nitrogen and phosphorous. Teff has low nutrient use efficiencies, as a consequence, the recommended N-rates for teff production range from 40 to 80 kg N ha^{-1} depending on soil type: the highest being in clay soils and the lowest in sandy clay soils.
Other limiting factors in teff cultivation are: limited availability of suitable mechanical technology, limited use of improved seeds, fragmented farm plots.


UNIVERSITÀ
CATTOLICA
del Sacro Cuore


MILANO


FONDAZIONE
ROMEO ED ENRICA INVERNIZZI