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The lexicon on agro techniques in Teff- A super millet

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Abstract
Major cereals *viz.*, rice, maize, wheat, etc., though capable of meeting food demands pose major concern in their production with high demand for external inputs. Continuous consumption of these crops is inviting many health issues as they are supplying only limited nutrition. Though, minor millets are being cultivated since ages in India as integral part of sustainable farming for their high nutritiousness, yet the value they fetch in the market is too low for a grower to lead a comfortable life. This is creating a wider socio-economic gap between the marginal and commercial farmers. Hence, there is an urgent need for a crop that can suffice both the hunger with high nutritional quality and can fetch higher returns for the farmer. Teff is one such minor millet native of Ethiopia where it is cultivated and consumed as staple food for about 50 percent population of the country. It is an intriguing grain, rich in nutrition compared to other cereals and is free of gluten and capable of yielding potentially higher even on marginal soils. Teff was introduced to India by CFTRI, Mysore for the benefit of both consumer and farmer, yet promotion and cultivation of Teff in India is still at infant stage as less is known about the crop and lack of any standard package of practices available for its cultivation. The present article is a brief review of the importance and agronomic practices of teff crop in a view to promote its cultivation and consumption in India.

Keywords: Agrotechniques, lodging, nutrition, teff and tiny seeds

Introduction
Teff (*Eragrostis tef* [Zucc.) Trotter), commonly known as “Williums love grass, teffa and annual bunch grass” in different parts of the world is native of Ethiopia (Vavilov, 1951) [1]. Being minor millet, it belongs to the Poaceae family, sub-family Eragrostoidae, tribe Eragrosteae and genus *Eragrostis*. The word “teff” is derived from the Amharic word “*teffa*” which means "lost", due to small size of the grain and how easily it is lost if dropped (Ketema, 1991) [2], while some say it was derived from Arabic word “tahf” a name given to similar wild plant (Constanza, 1974; Tadesse, 1975; Endeshaw, 1978) [3, 4, 5]. Domestication of teff started at the time of food scarcity due to famines (Tadesse, 1975 and Endeshaw, 1978) [4, 5] and now is the major indigenous cereal cultivated and consumed as a staple food for more than 85 per cent of the 85 million people of Ethiopia (Lee, 2018) [6]. In Ethiopia, teff ranks first in acreage (cultivated on 7.85 lakh hectares of land out of 11.2 lakh hectares of total land size) and second in production (1,117.24 m t) next to maize among the cereals (Tamirat and Tilahum, 2020) [7]. Simultaneously, benefits of teff cultivation are dispersing to various parts of the world *viz.*, Australia, Canada, Cameroon, China, India**,** South Africa, The Netherlands, UK, Uganda and USA. However, complete statistics with respect to teff production, consumption and trade are least accessible from those countries.

Plant biology
Teff is a sexually propagated, self-pollinating annual grass species (Dejene and Lemlem, 2012) [8]. It is tetraploid with a chromosome number of 2n = 40 and an allopolyploid (Endeshaw, 1978; Tareke, 1975; Tareke, 1981) [5, 9-10]. Teff is a warm seasonal annual grass in which all the plant biomass below the ground is called root and all that is seen above is called shoot. It has thin, slender stem made of longer internodes at the base and shorter at the apex, which opens into succulent and very thin leaves.

On an average a teff plant produces ten panicles (inflorescence), each panicle consisting of around 1000 seeds. The plant poses a diversified phenology under various climatic conditions as presented below in Table 1.

Teff seeds are the smallest seeds in the world with 1-1.7 mm length and 0.6-1 mm diameter and l000 seed weight measuring around 0.3-0.4 grams (weight of 150 teff grains = 1 grain weight of wheat) (Miller, 2007) [12]. The seeds are mucilaginous with various seed coat colour *viz.*, ivory, light tan to deep brown or dark reddish-brown purple, depending on the variety (upper class consumed the lighter grains while, the dark grain was the food of soldiers and servants). Majorly three types of seeds are available *viz.*,

White teff: Grows only in highlands, when used increases shelf life of injera, chestnut-like flavor and mostly preferred by the higher-class people.

Red/Brown teff: More adoptability, earthier and taste more like hazelnuts and mostly preferred by poor and working community.
Mixed: Has intermediate traits of white and brown type

Table 1: Phenological characters of teff

Phenological trait	Min.	Max.
Days to panicle emergence	25	81
Days to mature	60	140
Plant height (cm)	20	156
Culm length (cm)	11	82
First culm internode length (cm)	2.68	8.05
Second culm internode length (cm)	4.15	11.45
First and second culm internode diameter (cm)	1.2	4.5
Panicle length (cm)	10	65
Peduncle length (cm)	5.85	42.3
Number of primary panicle branches	10	40
Number of spikelets per panicle	30	1070
Number of florets per spikelet	3	17
Grain yield per panicle (g)	0.11	2.5
Number of tillers plant^{-1} (total)	4	22
Number of tillers plant^{-1} (fertile)	1	17
Grain yield per plant (g)	0.54	21.9
Total biomass per plant (g)	4	105
Source: Assefa *et al*., 2014 [11]		

(Source: Katelynn, 2020)

Fig 1: Teff plant (A) and seed types (B-Red/Brown teff, C-White teff, D-Mixed teff)

Nutritional composition of teff

Teff is an intriguing grain, ancient and minute in size packed with nutrition. Inspite of its tiny size, it embraces enormous nutritional factors in its seeds. Even teff straw got higher palatability due to its high nutrient composition and high succulent nature of the stem which makes teff straw much preferred by the cattle than any other cereal straw.

Nutritional composition of teff grain and straw

Table 2: Teff grains composition

Component	per 100 g
Water (g)	10.0
Energy (kJ)	1468
Protein (g)	12.3
Fat (g)	2.1
Starch (g)	59.8
Fibers (g)	7.9
Calcium (mg)	167
Iron (mg)	5.7
Magnesium (mg)	194
Potassium (mg)	477

***Source*:** Table 2: Akanksha *et al*., 2018

Table 3: Teff hay composition

Quality Parameters	Composition (%)
Crude Protein	9-14
Acid Detergent Fiber (ADF)	32 – 38
Neutral Detergent Fiber (NDF)	53 – 65
Total Digestible Nutrients (TDN)	55 - 64
Relative Feed Value (RFV)	80-120

***Source*:** Table 3: Miller, 2007

Table 4: Comparison between types of teff grains

Minerals (mg/100 g)	White teff	Red teff	Mixed teff
Iron	9.5-37.7	11.6 – 150	11.5 - 150
Zinc	2.4-6.8	2.3-6.7	3.8-3.9
Calcium	17-124	18-178	78.8-147
Copper	2.5-5.3	1.1-3.6	1.6

Source: Akanksha *et al*., 2018

Uses of Teff

- Teff flour is primarily used to make a fermented, sourdough type, flat bread called *Injera*.
- Teff is also eaten as porridge and also used for making traditional alcoholic drinks like *tella* (local opaque beer) and *katikalla* (local spirit), *kitta* (sweet dry unleavened bread) and *muk* (Gebremariam *et al*., 2012) [15].
- Cooked teff can be mixed with herbs, seeds, beans or tofu, garlic, and onions to make grain burgers.
- The seeds can also be sprouted and the sprouts used in salads and on sandwiches.
- Good thickener for soups, stews, gravies, and puddings and can also be used in stir-fry dishes, and casserole dishes.
- Best forage crop that is capable of yielding higher biomass coupled with high quality fodder for cattle (Miller, 2008) [16].
- Straw incorporated with mud to reinforce it and used in plastering the house walls.

Teff products*:* Teff flour can be used as a substitute for part of the flour in baked goods, or the grains added uncooked or substituted for part of the seeds. Appetizers Baked goods, Biscuits and scones Breads, Breakfast and desserts bars,

Breakfast dishes (to be eaten with fruits and milk, hot or cold), Brownies, Cakes and cupcakes Casserole dishes Cookies, Crackers Desserts, Dips, sauces and gravy Granolas (muesli) Muffins, Pancakes & waffles Pastas, Pie crusts Pizza crusts Rolls & buns Soups & stews, Tortillas and flat breads and Weaning food.

Soil and Climate

Teff is a tropical low risk cereal that grows in a wider ecology and can tolerate harsh environmental conditions where most other cereals are less viable (Gebremariam *et al*., 2012) [15]. Teff is a warm season annual grass that requires a frost-free growing season. It is cultivated from sea level up to 2800 m on soils with varying physical and chemical properties, in waterlogged and in well drained soils, in moisture stress areas having less than 300 mm of rainfall as well as in areas having 1000 mm seasonal rainfall. This gives an idea of the tremendous ecological diversity under which the crop can be grown (Ketema, 1991) [2]. Soil temperatures at planting should be at least 65 ºF (18.33 ^{0}C). Teff comes up well in light sandy loam to medium deep black soils. Teff seeds sown in clay loam soil significantly increased the plant growth attributes than sown in sandy loam soil due to finer clay particles with higher surface area can easily come in contact with small seeds and supports early and better establishment of the seedlings than sandy loam soils (Miller, 2008) [16].

Seed Bed Preparation

Teff requires a firm and compact seedbed (Miller, 2007) [12]. Two ploughings prior to sowing were optimum to attain significantly higher grain yield while no ploughing and more than two number of ploughings resulted in lower yields (Debelo, 1992) [17]. This is due to better contact between the seeds and soil under ploughed land than unploughed land, that resulted in better establishment of the crop. As the number of ploughings increased, the soil became more porous and seeds were placed at greater depth resulting in poor germination and crop density, resulting in lower yields. Teff grown on *Vertisols* under zero tillage system also resulted in significantly economic yield and benefits than broad bed and furrow, conservation tillage and minimum tillage systems (Tulema *et al*., 2007) [18]. Results also revealed that sub-soiling practice as water conservation technique on *Vertisol* ensured more porosity of the soil that enhanced infiltration rate and available soil moisture which was sufficient to meet the water requirement of the crop ultimately resulting in higher yield levels as compared to teff grown under conventional and minimum tillage systems (Melesse, 2007) [19].

Seed Selection (Variety, seed treatment, seed rate)

Teff seeds are the smallest seeds in the world. Though there is much lack of genetic improvement in teff varieties, few local varieties are promising yielders to the farmer. Seed variety chosen should be well adopted to the prevailing, soil and climatic conditions in order to achieve the higher yields. Between the Machere and Quncho varieties, Machere produced significantly higher yield attributes and yield but, shoot biomass and related parameters were better in Quncho variety (Alaminew and Legas, 2018) [20]. This is mainly attributed to genetic potentiality of the varieties. Similarly, Cross 387 gave higher grain yield than Cross 37 variety (Anon., 2008) [21].

Since, seeds are tiny the rate of planting is very less. Broadcasting the teff seeds at the rate of 25 kg ha^{-1} is the most common practice in Ethiopia yet some studies reported that seed rate of 5 kg ha^{-1} recorded significantly higher grain yield compared to higher seed rates (10, 15, 20, 25 and 30 kgs ha^{-1}) (Alaminew and Legas, 2018) [20]. Similarly, 74.19 to 78.54 per cent higher yield was achieved with 5 kg ha^{-1} under line sowing than broadcasting 25 kg ha^{-1} of seeds (Tesfay and Gabresamuel, 2016) [22]. Results also revealed that grain yield increases with increasing seed rate from 2.5 to 10 kg ha^{-1} and then declined with further increase in seed rate (Fekremariam *et al*., 2020) [23]. Significantly higher magnitudes of growth parameters, yield attributes and yield of teff can be attained at 10 kg ha^{-1} seed rate (Arefaine *et al*., 2020 and Biya, 2020) [24, 25]. This is due to lack of inter and intra-competition between the plants that resulted in better growth and development of the crop. Seeds sown at lower densities results in higher yield levels than compared to higher seed rates. An average of 1.5 kg raw or 3.0 kg coated seeds per acre are sufficient to attain optimum forage yield in summer (Miller, 2007) [12].

Seed treatment had least effect on enhanced germination of the seeds. Seeds treated with water (0.0 MPa) showed 99.0 per cent germination within two days which was on par with 0.3 MPa NaCl treatment (Debelo, 1992) [17]. This is due to increased water potential of solutions at higher concentrations caused exo-osmosis that badly affected physiological processes of seed germination.

Planting (time, method, spacing and depth)

Teff can be grown as both *Kharif* (June-July) and *Rabi* (October-November) for grain purpose or as summer forage (Miller, 2007) [12]. Sowing with onset of the monsoon was found to be optimum in order to achieve higher yield levels, while further delay even by 7 and 15 days resulted in lesser grain yield to the extent of 60 and 68 per cent, respectively. This is mainly attributed to the inter-specific competition by weeds that was severe under late sown crop (Juraimi *et al*., 2009) [26].

Method of planting has greater effect on growth and development of the crop (Arioglu *et al*., 2004) [27]. Broadcasting method was commonly practiced by the farmers producing minor millets. Row planting with seed drills has become popular for its own advantages, while, transplanting under limited water supply condition is gaining higher importance for its ease in better establishment and management of the crop (Abraham *et al*., 2014) [28]. Sowing teff in rows with seed drills is the best method of planting in terms of 38.20 to 90.67 per cent higher net returns than just broadcasting the seeds on field (Tesfay and Gebresamuel, 2016) [22]. Mean technical efficiency of row planting in teff was 90.93 per cent and efficient utilization of the available resources and inputs can increase this technical efficiency by additional 9.07 per cent (Oumer, 2017) [29]. Results of system of teff intensification revealed that, a four-fold increase in yield was obtained under transplanting over broadcasting in two varieties (Cross 37 and Cross 387, respectively) of teff crop (Arefaine *et al*., 2020) [24]. In the recent year, transplanting- wherein younger seedlings (15-21 days old) are raised in nursery are planted into field is drawing interest of the teff farmers as a promising tool for enhanced yield levels (Mahantesh *et al*., 2023) [30]. Transplanting resulted in 34 and 75 per cent higher grain yield over line sowing and broadcasting methods, respectively (Fekremariam *et al*., 2020) [23]. The variation in yield levels under different planting methods is mainly because of early establishment of the seedlings coupled with greater availability of all the resources *viz*., space, light, nutrients and moisture that lead to enhanced physiological processes reflected in higher growth and development of the crop. Reduced lodging was observed in transplanted teff which attributed to three-to-four-fold higher grain yield than under line

sowing method (Berhe *et al*., 2011) [31] and an ease in weed management than broadcasting method (Fufa *et al*., 2011 and Alemat *et al*., 2016) [32].

Solid lines with closer spacing in between the rows are recommended for the teff. Row spacing of 15-30 cm and an intra-row spacing upto 15 cm gave higher grain yield levels than increased inter and intra-row spacing under line sowing method (Abraham *et al*., 2014; Amare and Legas, 2015; Fekremariam *et al*., 2020) [34, 28, 23]. Optimum spacing in teff is vital as narrow planting enhanced the competitive ability of teff over weeds, but with increased height lodging was more resulting in lower yield and under wider spacing less yield is mainly because of lesser plant population. Many researchers found 20 cm inter row spacing is optimum to attain maximum grain yield levels (Ali *et al*., 2011; Wubante V 2017; Biya, 2020) [25]. Contrastingly, few studies also showed that spacing had least significant effect on biological yield (Fekremariam *et al*., 2014) [38]. Shorter crop duration (early panicle emergence and physiological maturity) under narrow spacing was because of severe intra-specific competition between the neighboring plants for the available resources (Bekalu and Tenaw, 2015) [39]. Higher grain yield and net returns were possible even with inter-row spacing of 10 cm provided with higher fertilizer supply (Jebesa and Abraham, 2016) [40]. However, some improved varieties of teff showed wider elasticity to yield optimally over a range of plant densities (Daniel *et al*., 2016) [41].

Depth of planting matters much in teff cultivation due to tiny size of the seeds. Seeds placed at 5 mm soil depth was found to be optimum with higher per cent germination (about 79-86 % on 4th day after sowing) in both Dabbi and DZ-01-354 cultivars of teff (Debelo, 1992) [17]. Seed placement should not exceed 1/4 inch in depth (Miller, 2007) [12]. Seeds placed at lesser depth/near surface were subjected to desiccation of seeds exposed to sunlight. Placing seeds deeper in soil delayed the germination hindering the plant emergence due to insufficient energy in the tiny seeds to emerge vigorously through the soil surface.

Nutrient Management

Teff responds well to applied fertilizers. Increased application of nutrients linearly increased grain yield levels (Temesegen, 2012 and Mahantesh *et al*., 2023) [30]. Teff is a nitro positive crop and responds linearly to increased nitrogen levels (Jebesa and Abraham, 2016) [40]. Increased supply of sole nitrogen recorded higher grain and biomass yield (Tamirat, 2019) [36]. Studies showed that increasing nitrogen rates alone increased grain yield and was economically feasible than supply of multinutrients along with nitrogen at lower rates (Habte and Boke, 2017) [43]. The lower yield level with supply of multinutrients is mainly because of increased concentration of one element had antagonistically affected the availability of another nutrient ultimately reflecting lower physiological activity associated with the deficient element. Application of micronutrients in areas of deficiency helped in attaining additional yield of teff to the tune of 14 to 15 per cent (Haileselassie *et al*., 2011) [44]. However, balanced nutrient supply resulted in 20.92 and 35.90 per cent higher grain yield and net returns, respectively over supply of only recommended dose of fertilizers (Assefa *et al*., 2016 and Ayalew and Habte, 2017) [46, 43].

Being a minor millet teff demands a lower rates of external fertilizer application. Supply of nutrients through a combination of both organic and inorganic fertilizer source at an optimum proportion recorded significantly higher yield and economic returns (Werede *et al*., 2018) [47]. This is mainly because supply of organic and inorganic fertilizers in appropriate proportions ensures availability of all the essential nutrients coupled with improved soil properties that sustains soil productivity in turn stabilizing yield levels. The replacement of inorganic fertilizer by organic sources is also an eco-friendly move that reduces the harmful impact on environment. Hence, teff can be better recommended for organic agriculture.

Regardless of the fertilizer type, the time, rate and method of fertilizer application greatly determines plant growth and development. Though, fertilizers are applied at the time of sowing in cereals, recent studies showed that split application of fertilizers gave significant results. Nitrogen applied prior to onset of stem elongation stimulated enhanced leaf area in turn resulting in higher photosynthetic and assimilation rates (Kebebew *et al*., 2013) [48]. Band application of fertilizers (placing along the seed rows) gave 78.54 per cent higher grain yield besides saving loss of fertilizer and helps in controlling weed growth than simply broadcasting the fertilizer on entire field (Tesfay and Gebresamuel, 2016) [22].

Lodging in teff

Lodging is the bending over or displacement of the stem and roots of grain crops from their proper and vertical placement (Seema *et al*., 2018) [49]. It causes difficulty in harvesting and results in reduced grain yield. The causes for lodging of plants are legion *viz*., seed type, stem nature, dense population, sowing date, disease, soil density, high nitrogen levels, storm damage, etc. that weakens the supportive system of the plant to upright (Rawson and Macpherson, 2000) [50]. Lodging is referred as 'an abundance disease' that is restricting the exploitation of yield promoting factor in major and nutri-cereals. Lodging is of much significance in cultivation of teff crop, because of its very thin nature of the stem that is incapable of supporting higher shoot biomass above the ground (Lee, 2018) [6]. Lodging in teff ranges between 20-100 per cent (Assefa *et al*., 2014) [11] and on an average 11-12 per cent yield loss in teff is attributed to lodging (vanDelden *et al*., 2010). Lodging increased with increased application of fertilizers to the tune of 20 to 90 per cent (Assefa *et al*., 2014; Mahantesh *et al*., 2023) [11, 30]. Among the supplied fertilizers, nitrogen has profound influence on lodging as it stimulated the higher shoot biomass and making stem more succulent that is incapable of supporting the greater biomass (Habtegebriel and Singh, 2006 and Tamirat, 2019) [52, 36]. However, lodging was less under row planting than broadcasting method and under wider spacing than narrow planting (Tamirat, 2019) [36].

Irrigation management

Teff can grow well under extreme moisture regimes of both drought and waterlogged conditions (Teklu and Tefera, 2005; Roseberg *et al*., 2006; Minten *et al*., 2013) [53, 54, 55]. The crop coefficient (K_c) values for teff at initial, vegetative, mid and late stages are 0.8-1.0, 0.95-1.0, 0.95-1.1 and 0.4-0.5, respectively (Araya *et al*., 2010) [56]. Moisture deficit during mid stage reduced yield by 30 per cent (Yihun *et al*., 2013) [57]. Grain filling stage is the more sensitive stage and any water deficit during this stage caused 69.89, 93.90 and 96.79 per cent reduction in CO_2 assimilation rate, transpiration rate and stomatal conductance coupled with visible leaf rolling over severe stress (supply of 25 % of field capacity) at establishment stage (Mengistu, 2009). In general, reducing 50 per cent of the irrigation water caused 36 and 69 per cent decreased biomass and grain yield (Hilemicael and Alaminew, 2017) [59].

Weed management

Teff surpasses weeds at initial stages by quickly emerging out of the soil and it is known to possess allelopathic effect on many weeds making it a much competitive against weeds during later stages of the crop growth (Haftamu *et al*., 2020) [60]. This was much observed in local landraces than the improved varieties. However, weed interference at initial stages suppress teff growth to great extent (Assefa *et al*., 2016) [46]. Weed control either through hand weeding or herbicide application at tillering stage are recommended to achieve higher yield levels (Debelo, 1992) [17]. Even one hand weeding in local teff varieties sown after single ploughing sufficiently increase yield over no weeding (Dawit *et al*., 2020) [61]. Herbicides recommended for other minor millets can be freely used in teff at any stage of the crop growth as it is found to be tolerant to herbicide application. However, injury to crop to some extent was observed when herbicides (2,4-D amine) applied at tillering stage (Hinds-Cook *et al*., 2010 and Norberg and Felix, 2014) [62, 63]. Herbicides for broad leaved weeds must be applied at least at 5-7 leaves stage of teff (Miller, 2008) [16].

Pests and diseases

Teff is least vulnerable to be attacked by the pests and diseases making it a low-risk crop for the marginal farmers (Fufa *et al*., 2011 and Minten *et al*., 2013) [32, 55]. However, at high humidity areas head smuts and rusts are observed (Stalknecht *et al*., 1993) [64].

Teff based cropping systems

Teff is a short duration crop hence, fits well as component crop into multiple cropping systems. It can be cultivated as an intercrop with *B. Carinata*, safflower, sunflower and wheat at varied space patterns (Bayu *et al*., 2007 and Agegnehu *et al*., 2014) [66, 65] and as relay crop in maize and sorghum (Worku, 2004) [67]. Mixed cropping of teff with sunflower is much popular subsistence farming practice, while mixed cropping with faba bean yielded higher economic returns as a commercial farming practice (Worku, 2004) [67].

Harvesting, threshing, yield and storage

Manual harvesting with the help of sickle is the usual practice since ages and is predominately practiced till today. Because of higher feed value, the crop is harvested awfully close to ground (Tamirat *et al*, 2020) [7]. Threshing is done by beating the plants against hard surface or trampling by the cattle. Utmost care should be taken to avoid loss of seeds as the seeds are minute in nature and this necessitates that threshing yard should be clean and free of mud and any other smaller particles to get pure teff seeds. Grain and biomass yield ranges between 1058-4599 and 6355-19630 kg ha^{-1}, respectively under Ethiopian agroclimatic conditions (Assefa *et al*., 2014) [11]. In India, 159 to 294 kg ha^{-1} grain yield and 249-474 kg ha^{-1} straw yield are expected as it is recently introduced to India and research is still at infant stage (Mahantesh *et al*., 2023) [30]. Storage of seeds doesn't require any special maintenance as it attracts no weevils and other storage pests, hence, reduced postharvest loss (Abel, 2005 and Yihun *et al*., 2013) [57, 68]. Care should be taken to restrict the movement of rodents. Teff seeds have longer shelf durability and can be stored upto two years without loss of viability.

Limitations in teff cultivation

Lack of awareness, availability of quality seeds, standard agrotechniques coupled with labour scarcity and market facilities are major stepback to teff cultivation. Tiny seeds coupled with lodging (Thin and weak stem) causes severe losses during harvesting and threshing.

Conclusion

Teff (*Eragrostis tef*) is a warm season annual grass native to Ethiopia. Teff is an intriguing grain, ancient, minute in size and packed with nutrition. It requires warm climate and comes up well on sandy to medium deep black soils with fine seedbed. Line sowing with 5-10 kg seeds ha^{-1} at shallow depth (<5mm) is better over broadcasting. Though, it comes up well throughout the year, summer crop gives quality seeds and fetches higher price. Responds well to fertilizers on areas of poor fertility, however, nitrogen should be cautiously applied to reduce extent of lodging as it is inevitable in teff. Irrigation at critical stage (mid stage) during drought periods results in maximum grain yield. Teff is much competitive than weeds because of its rapid growth and hardy nature, yet during severe weed menace few weedicides can be freely used before crop starts tillering. Few or no pests are observed in teff crop during on and off the field. Teff fits well as component crop in multiple cropping systems as intercrop/mixed and sequence crop because of its short duration and lesser competition for growth resources. Harvesting is of great concern in teff as the seeds are tiny and are much prone to losses. Manual harvesting at 85-90 DAS ensures least grain loss.

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