

Improved agronomic practices for the cultivation of ryegrass

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Ryegrass is a winter crop grown for getting high quality fodder. Its fodder is delicious, extremely nourishing, and easily digestible. It is multicut in nature and provides green fodder for 5-6 months from November to May. India currently has a 35.6% shortfall in green fodder. It is generally grown in pure stand but mixture/intercropping can also be done to fulfil this shortfall of green fodder deficit to some extent especially during lean period. With respect to seed production, most of the grasses including ryegrass are shy seeders with low seed production ability due to different factors. Forage crop seed availability meets about 15-20% of country needs. In the light of these points, improved agronomic practices for cultivation of annual ryegrass may helpful to fulfill the desired fodder demand especially during the lean period and getting high seed yield as well.

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INDIA is blessed with diversified type of livestock and its animal sector is one of the largest in the world comprising 56.7% of world's buffalo and 12.5% cattle. Feeding the animal with quality fodder is a major challenge for the farmers. Moreover, the winter months are considered a period of scarcity of forage supplies to the animals. At present, India faces the green fodder deficit of ~35.6% and at the same time, fodder offered to the animal is also poor in quality whose impact could be witnessed on milk production of milch animal. So in the present scenario of sustainable development, there is a need to cultivate such forage crops which fit in the current cropping system and give long term output to fill the deficit of green fodder for sustainable crop and dairy production. In this context, cultivation of ryegrass may be a viable option to fulfil the fodder supply to some extent especially during lean period. Lean period is time span when availability of green fodder is meagre or negligible. Ryegrass is a good forage crop for dairy animals. It is grown as both annual and

perennial crop. Scientifically annual ryegrass (Italian grass) is known as *Lolium multiflorum* while perennial ryegrass is *Lolium perenne*. Its plant height reaches up to 30–90 cm, but the average plant height is 50–60 cm with fine (7 mm) dark green leaves that are hairless on the underside, a blade folded about mid-rib in early shoots, and a dark green leaf base. It has ability to germinate and grow quickly and requires low to medium fertilization.

Ryegrass can also be grown as cover crop which develops dense root system to catch the nutrient and water efficiently in addition to break the hard pan in the sub soil. It also provides erosion control, increase percolation and reduces runoff with the ryegrass cultivation in high rainfall area. An exciting benefit from the cultivation of ryegrass is the production of green fodder availability during winter lean period owing to its readiness for harvesting from november and onwards. Ryegrass can be grown as nurse crop for legume cover crops when planted at low density and high densities smother weed growth

due to its quick establishment and growth. Ryegrass is also known for its good silage production capacity, making it a popular choice for supplementing feed when hay availability is expected to be limited. Ensiled annual ryegrass has increased cow feeding in small-scale dairy production systems. From quality point of view, it greatly improves milk production and milk quality particularly milk fat when fed to the animal, that's why it is known as *Makhanghas*. High palatability and digestibility make it an ideal crop for milch animal. However, chemical composition



Ryegrass at vegetative stage

mainly depends on maturity, stage of harvest and soil fertility. On an average, it contains 16% crude protein, 48-52% neutral detergent fibre, 30-35% acid detergent fibre, 7-8% total ash and 50-60% total digestible nutrient. Besides this, it is also good source of calcium and phosphorus. To get high biomass of ryegrass, the following improved agronomic practices should be adopted.

Climate requirement

It requires cold temperature range (18-25°C) for vegetative growth and warm temperature at the time of seed ripening. Temperature below 6-8°C hampered its growth considerably during the winter season. It thrives well under assured irrigated condition below 650 m elevation.

Crop mixture/intercropping

Ryegrass can be grown in monoculture or in mixture with berseem and shaftal to take first cut early in cool season. A balanced ratio of 40:60 of ryegrass + berseem gives good herbage yield. Intercropping of ryegrass with legumes (berseem and lucerne) and non-legumes (mustard, oats and barley) can also be done which may improve fodder quality with high protein. Ryegrass intercropping is given in Table 1.

Table 1. Intercropping combinations

Particular	Average green fodder yield (q/acre)
Ryegrass + Berseem	240-280
Ryegrass + Oats	180-250
Ryegrass + Lucerne	240-320
Ryegrass + Mustard	200-240

Varieties

Improved varieties of ryegrass are given in the Table 2.

Soil type and land preparation

It prefers cool climate and thrives well in medium to heavy texture soil due to their high water retention capacity and good edaphic environment. Ryegrass grows well on medium to heavy fertile soils. It thrives well in soil rich in calcium

Table 2. Improved varieties of ryegrass

Variety	Number of cuttings	Average yield (q/acre)	Characteristics
Punjab Ryegrass 1	5-6	325	It is fast growing multicut variety with soft stem and leaves that animal loves. Its cutting start from November to May.
Punjab Ryegrass 2	6	327	It is late flowering, multi cut fast growing variety. It has long broad leaves. Its nutritional quality particularly <i>in vitro</i> digestibility is better than Punjab ryegrass 1. It gives cutting from November to May.

and phosphorus. The crop can resist mild acidity, but waterlogging has an adverse effect on crop growth. Ryegrass seeds are small thus, need a fine seedbed for proper germination and establishment. The crop requires well prepared level land with 3-4 ploughing followed by planking. The fine seed bed improves the germination and establishment of crop.

Sowing time

Optimum sowing time is non-monetary input which helps in improving fodder yield of ryegrass. Optimum time of sowing ensures all the stages of crop growth coincide with optimum weather condition. It should be sown from last week of September to first week of October to provide green fodder from November to May.

Seed rate and sowing method

For good harvest of crop, sow 4 kg seed per acre of land. Ryegrass seed is very light in weight, so sowing method is very important. Seeds should be sown very carefully in the field as seeds put deeper in the soil will not be able to break through the soil surface. Sowing should be done by broadcasting method in wet soil, which involves mixing the seed with moist soil and broadcasted over the well prepared levelled land. Ryegrass can also be sown in line with a row spacing of 30 cm or dispersed in a row spacing using seed drill then covered with the plank and irrigation is given later.

Nutrient management

It is better to apply fertilizer on the basis of soil test report. Field should be manured with 15-20

tonnes well decomposed farm yard manure (FYM) at the time of land preparation to meet the requirement of secondary and micronutrients. At the time of sowing, 15 kg N should be applied which is available from 33 kg urea per acre and further 15 kg N (33 kg urea) after 30 days after sowing. Application of 30 kg N (66 kg urea) per acre should be given after every cutting for regeneration and growth.

Irrigation management

Irrigation is an important factor for proper growth and development of crop. The three main stages for irrigation in ryegrass seed production are tillering, head formation, and seed filling. The first irrigation should be given just after sowing while second irrigation 5-6 days after sowing. Later on, irrigate the crop at an interval of 10 days based on the prevailing weather conditions of the area. Irrigation must be applied after each cutting for proper tillering of crops.

Weed control

There is no herbicide recommended for weed control in ryegrass. Therefore, use best agronomic practices to provide a vigorous crop canopy as quickly possible. Vigorous crop of ryegrass does not allow weeds to flourish.

Harvesting and yield

Harvesting is done when crop attains 50-60 cm height from surface of the soil. The first cut is taken in about 55 days after sowing and the subsequent cuts at an interval of one month. About 5-6 cuts can be taken between November and May. The yield of green forage ranges from 320 to 330 q/acre.

Seed production

Seed is crucial and basic input to increase crop yields per unit area. Good vigorous seed utilizes all the resources below and above the ground and produce a reasonable output.

For seed production, fodder crop is left in the middle of March. Fertilize the crop with 15 Kg N/acre (33 kg urea) for higher seed production. During the production and ripening of the seed, irrigate the crop frequently, however, it is important to keep an eye on the seed crop to make sure it does not lodge.

Seed crop can be sown separately in rows of 50 cm apart up to November at a seed rate of 2-3 kg/acre. The harvesting of the mature crop should not be delayed as it may result in shattering of seed. Ryegrass sown timely for seed production matures in the first week of June. A good crop produces 2-3 quintals of seed per acre.

Issues

The demand of good quality fodder has been on rise and would continue due to continuous increasing population of livestock. Production and availability of good quality seed of ryegrass is not enough to meet the desired seed demand, as most of the farmers are mainly concentrated to grow food crops and side tracked fodder crops. Seed production of fodder is not linked by any incentive or minimum support price. Its seed production depends on number of environmental and physiological factors like photoperiod, thermo-period, humidity, soil conditions (does not grow well in waterlogged condition), etc. Seed setting and shattering is also one of the main challenges in ryegrass seed



Ryegrass at reproductive stage



Seed after threshing

production. Ryegrass plants can naturally shatter their seeds when they are ripe, making timing of the harvest critical. Delayed harvest can result in significant seed loss. Moreover, harvesting and post-harvest processing are not yet worked out efficiently for the ryegrass.

Way forward

In order to meet the rising demand for high-quality seed, the production of ryegrass seed will likely involve a combination of innovative technology, sustainable practices and market driven strategies while addressing environmental and climatic problems. The research and breeding initiatives should focus on developing ryegrass varieties with higher potential of seed yield in changing weather condition, drought tolerance and less prone to seed shattering during harvesting. Suitable region for good ryegrass seed production needs to be identified. Needs to develop seed standard and more refine region specific seed production technology for low cost innovative seed harvesting and processing of ryegrass. Its seed production should be linked with the general seed production. Creating awareness among the farmer's/livestock keepers about

the new varieties, available seed production technology and post-harvest processing, seed source and their benefit.

SUMMARY

India is a dwelling of huge livestock population, contributing to the national GDP. The profitability of livestock sector mainly depends on availability of green fodder throughout the year especially during lean period because feed cost alone account for 65-70% of total cost of milk production. As green fodder is the cheapest source of nutrition to the animals, ryegrass may be fulfilling the fodder supply to some extent during lean period. Its ease of establishment and versatility make it suitable for use as green fodder, silage and hay making, rendering it an exceptional forage crop compatible with diverse production systems, including intercropping with various other fodder crops. Therefore, adopting improved agronomic practices for cultivation of annual ryegrass may fulfill the desired demand during the period when availability of green fodder is less or negligible.

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