

# Increasing Availability of Green Fodder through a Sustainable Approach for Fodder Seed Production

By Anil Kumar Garg and  
Digvijay Singh

## INTRODUCTION

To meet the rapidly increasing demand for milk and milk products from domestic sources, productivity of milch animals has to be enhanced. Amongst others, availability of adequate feed resources at an affordable price is crucial. Considering the steady increase in the prices of concentrate feed ingredients in the recent years, green fodder is, today, a comparatively economical source of nutrients. Green fodder production in India per hectare of land is only 40 MT/ year. Use of certified fodder seeds of high yielding varieties /hybrids can help in significantly increasing the fodder output per hectare, from the land already in use for this purpose. Unlike food crops, there is hardly any systematic planning for the production and distribution of quality fodder seeds by the state and central agencies. As a result, milk producers engaged in fodder production have little or no access to certified/truthfully labelled fodder seeds. For milk production enhancement, all agencies concerned need to take up initiatives for the production and supply of quality fodder seeds to milk producers so that green fodder is made available to milch animals as per their nutrient requirements. A set protocol need to be followed by the agencies who intend to take up quality fodder seed production and marketing. For their benefit, each aspect is described in detail in this article.

## SEED MULTIPLICATION

In India, seed multiplication largely adheres to the limited generations system in a phased manner. The system recognizes three generations namely breeder, foundation and certified seeds. It provides adequate safeguards for quality assurance in the seed multiplication chain to maintain the purity of the variety as it flows from the plant

breeder to the farmer.

### Breeder Seed

Breeder seed is the progeny of nucleus seed of a variety and is produced by the originating breeder or by a sponsored breeder. The production of breeder seed is the mandate of the Indian Council of Agricultural Research (ICAR). This is identified with the Golden yellow tag.

### Foundation Seed

Foundation seed is the progeny of breeder seed and should be produced from breeder seed or from foundation seed which can be clearly traced to breeder seed. Foundation seed is required to meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, both at the field and laboratory testing. It is produced by various seed production companies and is identified with the White tag.

### Certified Seed

Certified seed is the progeny of foundation seed and must meet the standards of seed certification prescribed in the Indian Minimum Seeds Certification Standards, 1988. This is identified with the Blue tag.

### Truthfully labelled seed

The progenies of foundation seeds and quality assurance are carried out by the production agency itself. The minimum field and seed standards are same as in case of certified seed. This is identified with the Opal green tag. The certified/truthfully labelled seeds are used by the farmers for commercial production of the crop.

## QUALITY ASSURANCE

Quality of seed is determined by those factors inherent to the seed which influence the development and yield potential of the resultant plant. Important components of seed quality are: Genetic, Physical, Physiological,

**GREEN FODDER IS AN ECONOMICAL SOURCE OF NUTRIENTS FOR DAIRY ANIMALS. TO IMPROVE THE AVAILABILITY OF GREEN FODDER FROM THE LIMITED LAND UNDER FODDER CULTIVATION CERTAIN MEASURES NEED TO BE TAKEN. PRODUCTION AND MARKETING OF CERTIFIED / TRUTHFULLY LABELLED SEEDS OF GENETICALLY SUPERIOR FODDER CROPS ARE CRUCIAL. ADOPTION OF A SYSTEMIC, SCIENTIFIC AND LONG TERM APPROACH FOR FODDER CROPS SIMILAR TO THE ONE BEING FOLLOWED FOR FOOD CROPS CAN BOOST THE AVAILABILITY AND SUPPLY OF QUALITY FODDER SEEDS TO FARMERS. THIS WOULD LEAD TO SUSTAINABLE GROWTH IN GREEN FODDER PRODUCTION AND WOULD EVENTUALLY HELP IN ENHANCING MILK PRODUCTION.**

Mechanical mixtures and Seed health.

In India, the quality of seeds is determined by a process of Seed Certification. This is designed to maintain and make available to the public, through certification, high quality seeds of notified varieties so grown and distributed so as to ensure genetic identity and genetic purity. Seed certification is also designed to achieve prescribed standards and is a legally sanctioned process. However, seed certification is voluntary and labelling is compulsory in our country.

Certification is conducted by the State Seed Certification Agency, an autonomous organization, established through notification under section 8 of the Seeds Act, 1966. Minimum standard of germination, physical purity, other crop seeds and weed seeds for fodder crops are given in Table 1.

### **PROCESSING, STORAGE AND PACKAGING**

Seeds produced by farmers have huge variations in terms of physical size, shape and volume and are normally contaminated with impurities like chaff, thrash, straw, internodes, threads, dust, faecal matter of birds, weed, other crop/variety seed, gravel, metal etc.

For removing the impurities mentioned above and for achieving stringent seed certification standards, raw seeds are to be cleaned and processed in a precise manner before packaging, storage and marketing with the following objectives:

- To get uniform size of seeds in a lot.
- To upgrade qualities like germination.
- To inactivate the diseases caused by pests and minimize seed borne diseases.

#### **Cleaning and grading machines**

Seed cleaning and grading machines have been developed in the country using scientific knowledge and physical characteristics of seeds like shape, size, length, weight,

surface texture, density, colour, affinity for liquids and electrical conductivity. Machines are designed in such a way that minimum seed standards are achieved and there is no mechanical injury to the seed. A seed processing plant generally comprises of five major sections:

- **Cleaning Section** - For removal of undesirable foreign particles.
- **Grading section** - For sorting bold and healthy grains from under size, hollow and deceased seeds.
- **Treatment section** - For applying fungicide on seeds to protect them during storage/transportation/marketing.
- **Weighing and Packaging section** - For packaging the graded/treated seed.
- **Storage** - For storing the raw/graded seed.

To store seeds with higher moisture content, an artificial drying section is necessary to avoid damage by pest and mould during storage.

After processing, the seed is packed. Bagging requires filling the bag to an exact weight, sealing and labelling the bag. These operations are done either with hand or with manually operated machines, like weighing scale and bag sealer.

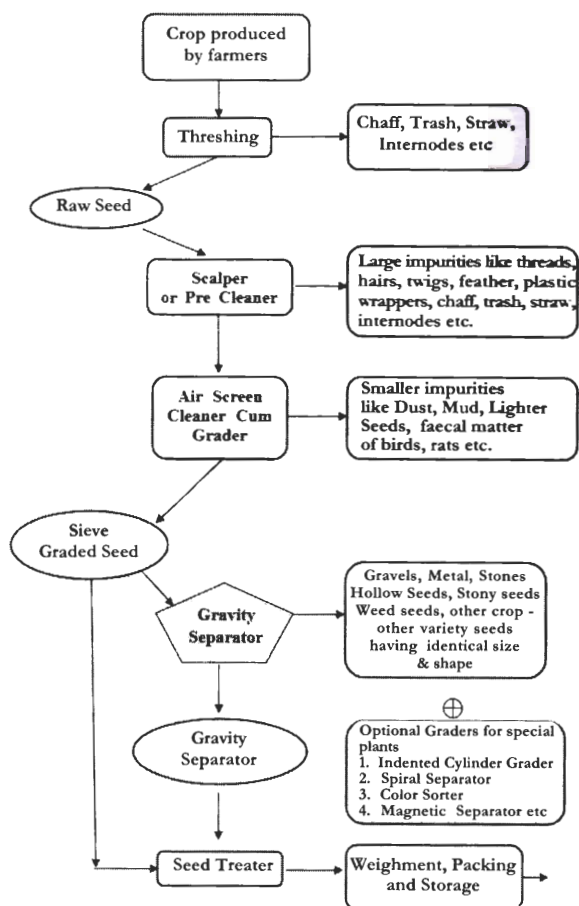
#### **Storage**

Good seed storage is essential to successful seed marketing. Proper storage preserves seed viability, from harvest to sale, and protects the producer, the processor and the user from pest infestation. Seed godowns should be rodent proof, fumigation friendly, well ventilated and free from water logging/seepage. Schematic flow chart for the seed processing plant is explained in Chart I.

#### **Layout Plan**

Commonly used layout plan for the seed processing plant is given in Fig. 1.

**Chart I: Seed Processing Plant for Ensured Quality Seed**



## TESTING

Good quality seed is essential for high crop production because cultural practices cannot compensate for poor quality seed. To guarantee quality, seed testing is necessary. Seed testing involves the determination of seed quality for germination and viability, physical and genetic purity, vigour, moisture content, health, size and uniformity in colour.

The objectives of seed testing are to:

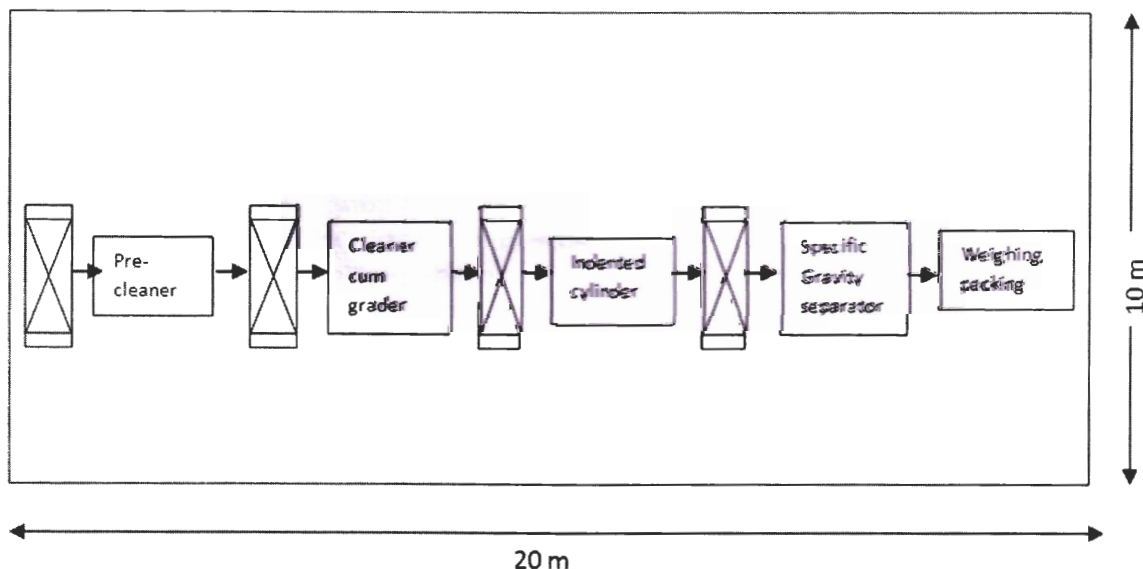
- Determine the planting value of seed.
- Discourage and prevent seed adulteration.
- Control the spread of noxious and other weed species.
- Provide information for labelling and to comply with seed law requirements under the Seeds Act, 1966
- Facilitate inter- state and international seed trade.
- Help in pricing, carry-over decisions, revalidation etc.
- Serve as an important tool for quality control during production, harvesting, processing, storage, transportation and marketing of the seed.
- Identify seed quality problems and their probable causes.

The seed testing is carried out at notified Seed Testing Laboratories available in various states.

## MARKETING

In seed industry, sales promotion is considered to be a key marketing tool. The promotional efforts should not only focus on the sale of product or services, but also on educating the masses and decision makers. The seed industry must use a variety of media ranging from demonstrations, farmers fairs, farmers training programmes,

**Fig. 1: Common Machinery Plan for the Seed Processing Plant**



farmers meeting, dealers conference, hoardings, posters and advertisement in news paper, TV, distribution of literature etc. to create awareness about their products and marketing them efficiently.

In our country, seeds are being marketed through a number of channels i.e. governmental outlets at block and village levels, cooperatives, seed corporations, private traders/dealers etc.

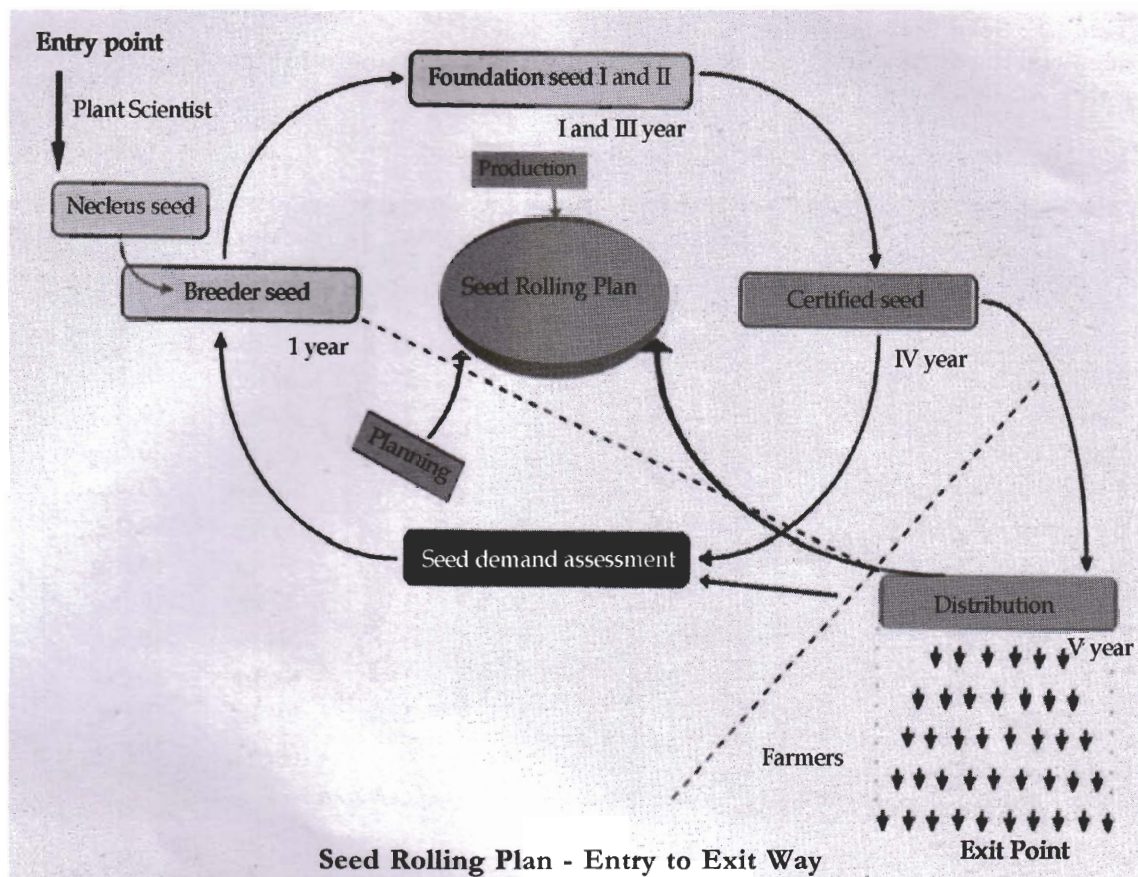
## LEGISLATION

The basic objective of seed legislation and its subsequent

enforcement is to regulate the quality of seed sold to the farmers. The various legislations applicable to seed industry are elaborated in the Seeds Act, Rules, Order, Essential Commodities Act and their amendments.

### Issues and constraints in enhancing production and availability of quality fodder seeds

- Lack of adequate up dated data state-wise, crop/variety-wise on requirement and availability of quality fodder seed.
- Absence of independent agency/government department at national/ state level to forecast fodder seed demand and coordinate its production through several organizations.
- In the absence of a firm demand from the user agencies, the organizations responsible for seed production do not give thrust on fodder seed production.
- Non availability of fodder seeds at government outlets, selling seeds of food crops, located in the village/block /taluka levels.
- Inadequate extension efforts in promotion of improved varieties of fodder crops among farmers.
- Lack of adequate manpower with Animal Husbandry Department at national/states level, to plan and promote



production and marketing of quality fodder seeds.

- Fodder and seed yields are inversely correlated; the improved varieties bred for higher green fodder production; yield low seeds, making seed production an unattractive proposition for the seed growers.
- Some fodder crops require specific agro climatic conditions for higher seed yield, resulting in long distance transportation for its marketing, which increases the cost.
- There are no alternative uses of many of the fodder seeds like berseem, lucerne, teosinte and fodder varieties of sorghum, cowpea, perennial grasses and legumes, which result in losses to the seed growers/producer if they remain unsold.
- Prolonged flowering, uneven maturity and seed shattering are problems in some of the fodder crops.

### Strategies to enhance fodder seed production

- There is an express need for effective synergy/convergence between agriculture and animal husbandry departments at state and national levels to organise production of fodder seeds to comply with the seed replacement norms. In consultation with the state animal husbandry departments, agriculture departments

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**Table 1.: Seed Standards**

Seed standards for foundation and certified seed classes and minimum limits of germination and purity for labelling

## A. Laboratory standards for fodder Seed crops in India

Crops	Pure Seed (Min.)		Inert matter (Max.)		Other Weed Seeds (Max.)		Total Weed Weeds (max.)	
	FS	CS	FS	CS	FS	CS	FS	CS
Maize-OP	98	98	2	2	5/kg	10/kg	None	None
Teosinte	98	98	2	2	5/kg	10/kg	None	None
Oats	98	98	2	2	10/kg	20/kg	10/kg	20/kg
Bajra	98	98	2	2	10/kg	20/kg	10/kg	20/kg
Sorghum - hybrid	98	98	2	2	5/kg	10/kg	5/kg	10/kg
Sorghum-OP	98	98	2	2	5/kg	10/kg	5/kg	10/kg
MP Chari	97	97	3	3	5/kg	10/kg	5/kg	10/kg
Cowpea	98	98	2	2	None	10/kg	None	10/kg
Guar (Clusterbean)	98	98	2	2	10/kg	20/kg	None	None
Berseem	98	98	2	2	10/kg	20/kg	10/kg	20/kg
Lucerne	98	98	2	2	10/kg	20/kg	10/kg	20/kg

*Note: The standards for truthfully labelled seeds are same as of certified seed*

## B. Specific standards prescribed for certification at field stage for different fodder seed crops

Crops	Minimum no. of inspections	Isolation distance in metres		Off-type plants/earheads		Inseparable other crop plants	
		FS	CS	FS	CS	FS	CS
Maize-OP	2	400	200	1	1	-	-
Teosinte	3	200	100	0.10	0.50	-	-
Oats	2	3	3	0.050	0.20	0.010	0.050
Pearl millet	3	400	200	0.050	0.10	-	-
Sorghum - hybrid (SSG)	3	200	100	0.10	0.20	-	-
Sorghum-OP	3	200	100	0.050	0.10	-	-
Cowpea	2	10	5	0.10	0.20	-	-
Guar (Cluster bean)	2	10	5	0.10	0.20	-	-
Berseem	2	400	100	0.20	0.10	-	None
Lucerne	2	400	100	0.20	1.0	-	-

*Note: The standards for truthfully labelled seeds are same as of certified seed*

(Standards are in percent unless indicated otherwise)

Objectionable Weed Seeds (max.)		Germination (Min.)		Moisture ( Max)				Other Distinguishable Varieties	
FS	CS	FS	CS	Ordinary container		Vapour proof container		FS	CS
-	-	90	90	12	12	8	8	-	-
-	-	80	80	12	12	8	8	-	-
2/kg	5/kg	85	85	12	12	8	8	-	-
-	-	75	75	12	12	8	8	-	-
-	-	75	75	12	8	8	10	20/kg	20/kg
-	-	75	75	12	12	8	8	10/kg	20/kg
-	-	75	75	12	12	8	8	10/kg	20/kg
-	-	75	75	9	9	8	8	5/kg	10/kg
-	-	70	70	9	9	8	8	10/kg	20/kg
5/kg	10/kg	80	80	10	10	7	7	-	-
5/kg	10/kg	80	80	10	10	7	7	-	-

Objectionable weed plants		Plants affected by seed borne diseases		Remarks
FS	CS	FS	CS	
-	-	-	-	
-	-	-	-	
0.010	0.020	0.10	0.50	Isolation in case of Loose smut 150 meters for both classes of seeds
-	-	0.050	0.10	Plant infected by downy mildew/green ear at any one inspection
-	-	0.050	0.10	Kernel smut or grain smut and head smut, Isolation from Johnson grass and forage sorghum 400 meters in both FS & CS From other species 200 meters for FS and 100 meters for CS
-	-	0.050	0.10	Kernel smut and grain smut, Isolation for Johnson grass and forage sorghum 400 meters in both FS & CS
-	-	0.10	0.20	
-	-	0.10	0.20	Disease: Bacterial blight, Anthracnose, Ascochyta blight.
0.050	-	-	-	Chicory (Kasni) is an objectionable weed. Isolation from other species 200 & 100 meters for both class
None	0.050	-	-	Dodder (Cuscuta)

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can forecast and estimate the crop-wise and variety-wise requirement of breeder/foundation /certified/truthfully labelled seeds of all fodder crops as is being done for food crops. The production of foundation/certified/truthfully labelled seeds could be facilitated through various public/private companies. The Department of Agriculture & Cooperation, Ministry of Agriculture, Government of India, may continue to organise production of breeder seeds of fodder crops as per demand through Indian Council of Agricultural Research (ICAR).

- Since fodder seed production and marketing activities are largely unorganised, public sector companies like National Seeds Corporation /State Seeds Corporations must take a lead role for production of fodder seeds, as being done for food crop seeds, in line with the seed replacement norms. To meet the demand for quality fodder seeds, cooperatives/commercial seed companies also need to be encouraged to participate actively in production/marketing of fodder seeds.
- Marketing of fodder seeds needs to be undertaken by all the agencies that are marketing food crop seeds.
- Extension with regard to cultivating fodder crops with high yielding varieties needs to be undertaken by all organizations like Indian Council of Agricultural Research /State Agricultural Universities/ Krishi Vigyan Kendra (KVKs)/Dairy Cooperatives as well as Central and State Department of Animal Husbandry & Dairying.
- There is a need to consider incentives to seed growers to compensate higher cost of production of fodder seed due to low seed yield.
- There is a need for the creation of **Regional Fodder Seed Grid** which would cater to the **needs of the region** for various types of fodder seeds **suited** to their agro-climatic conditions.
- To improve the economics of fodder seed production, there is a need to focus on development of dual purpose improved varieties of fodder crops.

## CONCLUSION

Green fodder is an economical source of nutrients for dairy animals. To improve the availability of green fodder from the limited land under fodder cultivation, production and marketing of certified/truthfully labelled seed of superior genetics of various fodder crops is crucial. Adoption of a systemic, scientific and long term approach for fodder crops similar to the one being followed in food crops can boost the availability and supply of

quality fodder seeds to farmers, leading to sustainable growth in green fodder production, which would eventually help in enhancing milk production.

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Anil Kumar Garg  
Deputy General Manager  
(Animal Nutrition)  
NDDB, Anand, Gujarat  
E-mail: [akgarg@nddb.coop](mailto:akgarg@nddb.coop)



Digvijay Singh  
Manager  
(Animal Nutrition)  
NDDB, Anand, Gujarat  
E-mail: [dsingh@nddb.coop](mailto:dsingh@nddb.coop)

