

Forage seed production and management techniques

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1. Introduction

Despite the large number of recommended and registered forage crop varieties and species for the different agro-ecologies of Ethiopia and critical feed shortage revealed by the very poor livestock productivity, adoption and use of cultivated forage crops in the country is still low. Some of the reasons indicated are inadequate quantity and quality seed supply, lack of technical skills, low seed productivity of forages especially perennial grasses and legumes and poor and subsistence production and none market oriented production systems. These calls to look into the status of the Ethiopian forage seed system, identify the major constraints and enhance forage seed production to improve the seed supply system in the country. The objective of this brief is to give an overview of forage seed systems and recommend major seed production practices in Ethiopia.

2. Forage seed systems

The forage seed production systems in Ethiopia are generally not well developed. The existing forage seed production is broadly categorized as the formal and informal seed systems. Under the formal seed production systems commercial seed production involves seed growers organized in the form of enterprises including the Oromia seed enterprise and Amhara seed enterprises. On the other

hand, there are few small-scale forage seed business private firms currently emerging around forage seed production and trading business in Ethiopia. Some of these firms have their own pieces of land or use outreach farmers to produce forage seeds and need to be provided with technical training and quality basic seeds. Forage seeds produced by the informal systems are seeds produced by farmers' cooperatives and unions, individual farmers specially those forages seeds that require less technical skills, for example, seeds of lablab, cowpea, oats and vetch. In addition, seeds produced by the community in places like farmers training centres (FTCs) and seeds produced by research centres such as International Livestock Research Institute (ILRI) and federal and regional research centres belong to the informal system. Research centres are mandated with collecting and maintaining forage genetic materials from various sources. They also multiply planting materials in limited quantities for dissemination to researchers, seed growers and extension work on a not-for-profit basis.

3. Field management activities of forage seed production

a) Site selection

Most often sites suitable for herbage production may not be suitable for forage seed production. Identifying suitable sites for seed production of a given forage crop is very essential for high and quality seed production. Experience is usually much helpful. During site selection, one must look at the climate, soil, pests and diseases, accessibility and related factors. Forage crops have different adaptations to soil conditions. The major soil characteristics include soil fertility in terms of the major soil nutrients, type, texture, pH, acidity, alkalinity, salinity, water logging and land use history on previous crops should be reviewed for the given forage to be planted. The amount and distribution of rainfall, amount, quality and accessibility of irrigated water should also be studied. The average air temperature of the site and extreme temperatures which affect flowering and pollination, and occurrence of frost is critical to decide which type of forages to be grown for seed. Altitude is a good indicator of agro-ecologies. But note that there is high variability within similar altitude ranges.

b) Planting

Preparing seedbed —The quality of seedbed prepared may vary according to the type of forage crop to be planted. Perennial species, which usually have smaller seed sizes, require fine seedbed preparation. The seedbed should be free of weeds and when weeds are expected to be problem pre-emergence herbicides might be used. To keep genetic purities of the varieties it is essential to know the land history (previous year plantings). In addition, if different varieties of the same species are planted in the nearby area and if the species is cross pollinated type, the recommended isolation distance need to be maintained.

Preparing seeds or planting materials— Planting materials could be seeds, seedlings, cuttings and root splits (Photo 1). Prepare the required amount of seed or planting materials and make sure the seed is a prescribed variety from a known source/certified seed with the recommended quality. If the seed is known to have dormancy or hard seed coat, treat the seed with the recommended procedures. Some legume forage crops when planted in new places require inoculation with strains of Rhizobium for proper nitrogen fixation. Cuttings or root splits make establishment easier, but transportation is usually heavier, for example, elephant grass and desho grass. Make sure cuttings and root splits to be used for planting are free of potential diseases. Most browse trees and some forage crops like fodder beet are established from seedlings. Seedlings have the advantage of fast establishment and can better compete with weeds.

Photo 1. Forage seeds cowpea (i), alfalfa (ii) and planting materials stem cuttings (iii) and root splits (iv). *Photo credit: ILRI/Getnet Assefa*

i.



ii.



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Planting methods—Forage crops could be planted in rows or by broadcasting. Row planting has many advantages. It is usually more productive and conducive for field management like weeding. When planted in rows, keep the recommended spacing between rows and plants. Seed should be sown at the recommended depth of the respective species. Most small seeded forage species, especially perennial grasses and herbaceous legumes, seeds should be covered with soil lightly or left uncovered; some methods like using tree branches or driving animals as it is used for sowing teff crop can also be employed for such forage crops.

Applying fertilizer—Applying fertilizer need to be based on soil test for macro and micro soil nutrients. It is advisable the soil nutrient condition of macro (N, P, K, Ca, Mg) and micro (B, S, Mn, Zn) minerals are known for the given field or locality. Carefully understand the recommended

rates for the crop and the surrounding farms. Compost and manure could be alternative sources of fertilizer. Applying the recommended practices like split application should be practised. Note that perennial forages need to be applied with fertilizer periodically. Apply at the right time of the season and plant growth.

c) Seedlings and weeding

Follow-up on the germination and stand—Emerging of seedlings starts 3–4 days after planting and could delay depending on the species and weather factors. If there are problems of germination it is good to reseed to fill the gap of poor germination. Record all observations for possible action any time. Check all the drainage structures are maintained and firm, usually damages from flooding occurs at an early stage of planting.

Pests and diseases—Depending on the type of forage crop and location, pests can cause trouble starting from sowing. It is common to find birds and insects consuming the sown seeds. At seedling stage cutting and sucking insects as aphids could attack. When seedlings grow different types of diseases could occur like stem rusts in oats. Generally, forage crops are tolerant and usually not attacked by diseases and pests.

Weed control—Weed control should be planned starting from land preparation. Early planting is always an advantage for weed control. Depending on the species, weed could be controlled by hand weeding or appropriate herbicides. Early weeding usually helps for vigorous growth of the crop. At flowering stage, rouging of phenotypically off type plants is very essential to produce genetically pure seed.

d) Harvesting
Peculiar characteristics of forage seed crops—Seeds of many grasses and legumes lack uniformity in maturity (indeterminant type of flowering).

Shattering is a common problem in many of the species. Some grasses like panicum are seriously damaged by birds. In some areas frost can damage forage seeds. The seed producers need to know the specific characteristics of the variety/species grown for forage seed production. The most successful way of managing forage seeds is through experience.

Preparing and harvesting—Prepare all the necessary materials including harvesting tools or machines, drying and threshing places. Plan the date of harvest, which is suitable for drying and threshing. Decide the harvesting method—manually (picking, sweeping, cutting, shaking and stripping) or machineries, single or repeated harvesting. The harvested but unthreshed bundle of seed must be handled carefully to minimize seed loss due to shattering. After drying they have to be piled properly until they are threshed. However, some species such as Rhodes and panicum grasses need to undergo a process called sweating. This is piling the fresh harvested heads of the bundles of seeds and allow them to get warm (sweat) and ripe the seed. Moreover, sweating has the advantage of easing threshing.

e) Threshing and cleaning

Threshing is separating the seed from the rest of the cut material/chaff and straw. Threshing could be done manually, using animals or machineries. Care should be taken to minimize or avoid damage of seeds (broken seeds) during threshing. Threshing of fresh seed should be dried under the shade or in sunshine with good ventilation. The fresh seed with 40–70% moisture needs to dry up to 5–10% moisture level. The threshed seed has different unwanted materials, including: chaffs, weed seeds and soil materials. These materials need to be cleaned. Seed cleaning could be done mostly using sieves and wind (winnowing). These activities are accomplished manually using human labour or machineries. There are normally three stages of cleaning:

the first one is pre-cleaning, which is removing bulk materials like chaff, which is followed by basic cleaning where more refined air screen cleaner is used and finally separating seed and grading is made by removing larger or smaller seeds which are out of the required size.

f) Seed purity, viability, packaging and storage

The final seed material must be checked for purity and viability in laboratory tests from homogenous samples. Viability/germination could be affected by dormancy for many forage grass species and requires treatment. Forage seeds need to be treated using different chemicals like fungicides before packaging and storage to increase the shelf life of the seed and stop the effect of pests and disease during planting.

There should be a proper seed packaging and labelling for dissemination. Packaging will help against seed damage or loss. The packaging should be to the standard which is waterproof or moisture resistant. The label should include species name, cultivar/accession number, lot number, harvest date, site and owner/organization.

For keeping quality and longer shelf life of the seeds, storage of the packed seed should consider the following:

- Seeds need to be stored in a cold place (15–17°C). The seeds should be kept in a dry and away from direct sunlight.
- Depending on the length of storage the temperature could be adjusted for long-term storage, refrigeration could also be an option.
- Farmers use different local skills to store crop seeds and the same practice can apply to forage seeds with expert advice.

g) Forage seed certification/quality assurance

Forage seed certification is an approval procedure of seed production from field and seed preparation to packaging according to the set standards. It is a very essential system as it provides confidence both for the seed producers and users. It keeps the marketing system strong and more sustainable. In Ethiopia, most of the recommended forage species/ varieties have seed production standards approved by the Ethiopian Standards Authority. However, the standards are strict and unachievable under the existing conditions in Ethiopia for various reasons. Currently, an acceptable way of certification called Quality Declared Seed (QDS) is in place, which is appropriate for the seed system in the country. The QDS standards for some forage crops are also developed and there is also a need to include the standards for the newly registered varieties.

h) Forage seed marketing

Though the high livestock population and the demand for a large area of cultivated forage production forage seed marketing is not well developed in Ethiopia, primarily due to the low adoption of forage cultivation in the country. There are only a few private seed producers, and their customers are government extension system and development actors, only an insignificant number of farmers buy seed. The larger seed enterprises are mainly focusing on cereal food crops and forage seed production by these enterprises is almost nil. Development actors provide forage seeds to farmers free of cost, which have affected the seed marketing. Strong

and well structured extension forage development system in the country could improve forage adoption and seed marketing.

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Resources

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