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Factsheet

GUINEA GRASS (Panicum maximum) SEED PRODUCTION

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Local Guinea grasses which grow naturally throughout the Caribbean are usually highly desirable forage types. Many new lines from Africa have been tested by CARDI over the past decade but in general, local strains lose little in comparison with the best of these; they are as productive as most and are just as well accepted by livestock. Only the largest, coarsest, "Giant" forms should be avoided for new pasture development. Furthermore, Guinea grass has a very broad adaptability range, growing well on a wide range of soils (including calcareous types derived from coral, volcanic types and heavy clays too, provided drainage is not seriously impeded) and most rainfall zones in the Caribbean (1000 to 3000 mm).

Although Guinea grasses are prolific seed producers, attemps to harvest worthwhile yields of viable seed are usually unsuccessful. Frequently, the seed produced has very low germination (<5%). One of the main difficulties is the very wide range of seed maturity between and within individual seed heads (inflorescences) i.e., flowering proceeds over a very long period making it difficult to decide when to harvest. If we wait long enough to harvest seed from late-emerging seedheads, or from the late maturing parts of individual heads, a high proportion of the seed will have been shed. Also, the longer we wait, the greater the chance of seed loss from sudden rain squalls. But, if we harvest too soon, a high proportion of the seed will be too immature to be viable.

Guinea grass (Combs and Baker)

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SEED PRODUCTION

How can high yields of good quality seed be produced from natural stands of Guinea grass?

1. Select an area of vigorous Guinea grass and cut it back to 15 – 20 cm (6 – 8 in) above the ground, at the beginning of the wet season.

2. Since seed yields are closely related to soil fertility and especially its nitrogen level, we can maximise yields by applying fertiliser. Apply either 300 kg/ha* of ammonium sulphate or 100 kg/ha of urea to supply nitrogen and either 75 kg/ha of triple super-

* For all practical purposes kg/ha are equivalent to 1 lb/ac.

Fig. 1. Guinea grass at the "boot" stage.

phosphate or 200 kg/ha of ordinary superphosphate to supply phosphorus, at the beginning of the wet season. To maximise yields from a second crop of seed late in the growing season, apply a maintenance dressing of either 150 kg/ha of ammonium sulphate or 50 kg/ha of urea.

3. Record the date when the first crop of seedheads are just about to emerge (Fig. 1).

4. Wait three weeks and then harvest seedheads with a sickle. Cut only seedheads and seedhead stalks.

Avoid cutting too much leaf as this will encourage moulding during the "sweating" process. The best way to avoid including leaf is to actually pull the seedheads away from the plants – all leaves will be left behind.

In areas where the date of head emergence is not known, several methods can be used to ensure the harvest of a substantial proportion of viable seed. Evidence of very recent seed loss from the lower parts of the most advanced seedheads is quite a good indicator of a good time to harvest. Alternatively, begin harvesting when 60 – 70% of the seedheads have emerged. First formed seedheads produce more seed and of better quality than later formed ones. If you wait until all heads have emerged, the first-formed ones will have lost their seeds. The **alternative shaking technique** will also ensure that quality seed will be harvested from such stands.

5. Sweating. Pile the seedheads in a heap inside a well ventilated building preferably with a concrete floor, for 3 days to allow "sweating" (Fig. 2).

The main aims of sweating are:

1. To detach the seed from the heads.

2. To allow immature seed to mature fully.

3. To enable damaged seed to repair.

Since the aim is to maintain a high moisture level inside the stack to enable continuing maturation, cover the stack with sacks. Heat buildup is highest in the first day. To avoid over-heating do not pile higher than about 1 m (3 ft). If the stack is still very hot during the second day turn it to release the heat. Otherwise, leave the stack for 3 days before opening. If it is left beyond this time mould and fungus build up will cause seed deterioration.

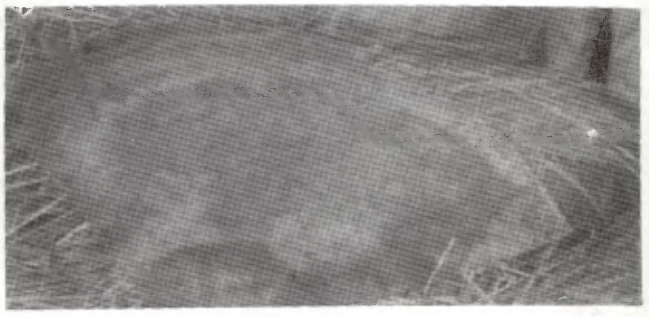

Fig. 2. Sweating Guinea grass seedheads.

Alternative shaking method

Good quality seed can be selectively shaken out of seedheads into bags, in the field. Hold a bundle of seedheads together and turn it downwards into a bag and shake vigorously. Do this every 2 – 3 days to maximise production. It is a very time consuming method but a feasible way to give excellent yields from small areas. Such seed can be dried without going through the sweating stage.

6. Drying period. Spread the heads out in a well ventilated area, ideally, an open-sided shed. Avoid drying in direct sunlight and at temperatures above 40°C (104°F). Do not force-dry at temperatures above 50°C (122°F) as this will cause seed damage. Drying will usually take less than one week.

7. Shaking. After 1 week, gently shake heads to remove the last of the mature seed. Seed that cannot be readily shaken from the heads is too immature to be viable – discard it.

SEED PROCESSING AND STORAGE

1. Screening. Following shaking, seed purity can be imporved by screening out most inert material larger in size than the seed. Screens (sieves) can be made locally attaching wire screening to wooden frames 60 cm x 60 cm (2 ft x 2 ft) i.e., made from dressed 2.5 cm x 10 cm (1 in x 4 in) timber. Screen first through a 1/4 in or 3/16 in sieve and then finally through a 1/8 in.

2. Winnowing. Seed quality can be improved prior to storage by winnowing off the proportion which does not contain plump healthy grain (caryopses). Work when there is a steady gentle breeze (8 kmp or 5 mph). Discard seed that has fallen furthest down wind. Repeat a second and perhaps third time. Check to make sure that healthy seed is not being discarded by rubbing seed samples in the palm of the hand. Healthy seed will have a gritty feel because of the presence of grains within the seed covers (glumes). For large scale production, seed quality can be improved with mechanical seed cleaners.

With careful adjustment, most non-viable seed can be separated out.

Insufficient drying and poor storage are primary causes of poor grass seed quality. It really is too risky to assume without measurement, that after several days of drying the seed can be safely stored. We are aiming to store seed at 6 to 9% moisture – above about 10% it will heat in storage and deteriorate. How can we determine the moisture level of the seed? We can ask our agricultural officer to determine it for us or do it ourselves:

Take 2 or 3 samples of seed of 3 – 5 gm each. Weigh each accurately. Place them in an oven set at 100° – 120° C (212 – 250°F) for 1 – 2 hours and then weigh again.

$$\text{Moisture content (\%)} = \frac{\text{First weight} - \text{second weight}}{\text{First weight}} \times 100$$

e.g. First weight = 5 gm
Second " = 4.5 gm

$$= \frac{5 - 4.5}{5} \times 100 = 10\%$$

3. Storage

The most important aim of good storage is to prevent humidity fluctuations. This is the greatest cause of seed deterioration. Therefore, once dried to 6 – 9% moisture seal the seed in airtight containers.

A further safeguard is to dust the seed with a fungicide (e.g., Captain, Thiram (R) or Zineb (R)) and insecticide (Malathion (R)) to remove or prevent any disease and insect problems.

4. "Post-harvest dormancy"

Guinea grass seed exhibits a post-harvest dormancy (i.e. Fresh seed shows almost no germination) which is usually lost after 6 months storage. Only then should seed be sown. Consequently good storage is essential while dormancy is being lost. Storage temperatures are less important than humidity control. However, ideally, seed should be stored at less than 16°C (60° F).

SEED QUALITY

The hand-rubbing method can be used to quite accurately determine the actual proportion of true seed in seed lots. Take several random samples of seed, each to partly fill the palm – count the number in each sample – rub vigorously into the palm with the side of the other hand and then count the number of the true seeds (grains) which have rubbed out from their glumes.

e.g., Unrubbed seed = 50
Rubbed out seed = 25 i.e., 50% true seed.

Seed germination

Before sowing or selling, all seed should be tested for germination. Take several samples (4 – 5) from the seed lot and count out 100 seeds. Place each sample onto moist blotting paper in a separate glass dish or plastic tray. Keep the blotting paper moist. Count the number of seeds that germinate, every week for 3 – 4 weeks. Since 100 seeds were counted into each dish, the number that germinate will be the percentage germination. We should aim at a **minimum** of 20% germination.

Multi-purpose forage/mulch/seed "banks" of Guinea grass

The establishment of multi-purpose "banks" of Guinea grass could well be a worthwhile investment for many Caribbean small farmers with mixed cropping and livestock enterprises, especially in areas with typical long dry periods:

1. For seed production.
2. For emergency livestock feed – cut and carry.
3. For use as a mulch in cropping programmes to conserve moisture and reduce weeds.

Vegetative shoots with roots attached can be split from natural stands and planted at 0.5 x 0.5 m (18 in x 18 in) spacing in blocks alongside or within cropping areas. Seedbeds should be well prepared and weedfree and high fertility ensured with the fertiliser programme outlined previously. These "banks" are a valuable resource

and should be treated as such. Treat them the way you treat your crops! Once established, they can be kept weedfree by occasionally spraying between Guinea grass plants with a mixture of Gramoxone(R) (Paraquat) and Reglone(R) (Diquat). When producing seed from them, carefully follow the advice given in this Factsheet – the need for close scrutiny cannot be over-emphasised. You must be a good observer of plant growth and be ready to take remedial action when necessary, e.g., insects can build up rapidly during seed production; lack of action can mean a rapid reduction in yields. The Guinea grass with (MOCIS LATIPES) can be a major part at this time.

The principles of mulching with guinea grass have been described in CARDI Factsheet No. A/F-5-85 "Mulching in a dry-farming system."

Disclaimer:

Mention of an insecticide or fungicide in this Factsheet does not constitute recommendation or endorsement, nor does omission constitute an adverse criticism. Names are cited solely as examples.

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