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PASTURE SEED PRODUCTION IN ANTIGUA

R. T. Paterson

CARDI-EDF Forages Programme
P.O. Box 766,
St. John's, Antigua

INTRODUCTION

A programme of pasture research and development was initiated in Antigua in 1974 under the auspices of the University of the West Indies (UWI). The initial objectives of the programme included the identification of well adapted and productive forage plants, both grasses and legumes, and the design and demonstration of forage systems relevant to conditions in the drier parts of the Caribbean. Over the first few years, more than 100 grasses and 300 legume accessions were tested in almost 2,000 research plots sown at 5 contrasting sites. Most of the grasses were African in origin, but nearly 75% of the legumes were collected in the Caribbean or in the Yucatan Peninsula of Mexico.

In 1979, the programme and its staff were transferred from UWI to the Caribbean Agricultural Research and Development Institute (CARDI). Since the preliminary investigation phase had led to the identification of several suitable pasture species, the direction of the work was modified to give more emphasis to development within the region. Towards this end, the new objectives included research into establishment and management practices and the provision of seed, advice and training for local staff from several countries in the Eastern Caribbean. This work was well documented in Annual Reports from both UWI and CARDI and more recently has been summarized by Keoghan (1987: In press).

As a result of the species selection work, it became obvious that in many instances, the cultivars or species of pastures available on the world market were not those that were best adapted to the specific nature of the calcareous soils of the region (eg. **Teramnus labialis, Macroptilium atropurpureum** cv. Mexican Macro, Y61). This, coupled with the problems involved in the importation of seed from Australia or East Africa, indicated the need to produce seed locally. CARDI was initially hampered by the lack of land under its direct control but in this period it received valuable cooperation from the Ministry of Agriculture of Antigua and Barbuda who made available the use of all the facilities at Diamonds Estate. With the establishment of the CARDI Field Station at Betty's Hope in Antigua, the stage was set for a major expansion in pasture seed production. Unfortunately, this coincided with the severe drought of 1983-84, where in a period of 20 months the total rainfall in Antigua was less than half the long term annual average. The drought delayed expansion plans but the programme has now resumed its planned course.

THE PRESENT SCHEME

Sources of vegetative material of several tropical grasses which were selected by the programme (e.g. **Cynodon** spp., **Digitaria decumbens** cv. Transvala, etc.) are maintained for the provision of vegetative material in most

of the countries of the Eastern Caribbean, while small amounts of seed suitable for neutral to alkaline soils are produced by CARDI in Trinidad. An interest is being shown in pasture seed production in Barbados, but the major production centre in the region is the CARDI facility in Antigua, where technical and financial assistance is provided by the European Development Fund (EDF). The comments and data which follow apply only to the project in Antigua.

The primary objective of the programme is to make available seed of species and cultivars of both grasses and legumes that are known to be well adapted to the neutral to alkaline soils of the drier areas of the Eastern Caribbean.

The immediate aim is to achieve regional self-sufficiency. The seed is directly produced by CARDI and distributed free-of-charge to governments and development agencies within the CARICOM nations. Where available, seed is supplied on request to areas outside of the CARICOM agreement, at a price related to the cost of production and freight charges. At present, the seed is supplied without guarantee of purity or germination since facilities have not yet been installed to performe these analyses. However, since from 20 to 30% of the produce is used in on-farm sowings in Antigua, any problems with a particular seed lot would become immediately apparent.

Production Methods

The methods employed to produce pasture seed in Antigua correspond roughly to the System Number 5, Grasses and Legumes as Crops, described by Ferguson (1979). Production is not combined with grazing, since CARDI does not have any animals in Antigua. Defoliation between harvests, particularly of the grasses, is effected either by use of a forage harvester or by cutting and raking to remove the cut material. The grass seed harvest is not yet mechanized, although plans are in hand to obtain the necessary machinery.

Grasses

The grasses **Panicum maximum, P. coloratum** and **Chrysopogon** sp. are handled in the following way: The area is cut at the start of the rains to help control weeds and to induce uniformity in seed maturity. It is fertilized, mainly with N and P, and where necessary weeds are chemically controlled either by an overall application of 2,4-D or by a directed application of an appropriate herbicide between the rows of grass. When the first seeds start to shed, the heads are harvested by hand, using a sickle. The heads are stacked to sweat for a period of about 3 days. When the stack is opened, the heads are lightly beaten by hand to remove the seed material, which is then dried and passed through a seed cleaner. The seed is stored in bulk in a cold store in order to break the physiological dormancy before being distributed to user organizations.

After harvest, the area is again cut in order to repeat the process. In the past, the number of harvests has depended on the duration of the wet season, but recently installed irrigation facilities should permit at least three harvests per year at Betty's Hope.

Legumes

Teramnus labialis and **Neonotonia wightii** produce only a single harvest per year, in the early part of the dry season, but multiple harvests of **Macroptilium atropurpureum** are possible since peak flowering occurs as a response to moisture stress. Of the three major legume species, both **Teramnus** and **Macroptilium** show a marked tendency for the pods to shatter, so the timing of the harvests of these species is of critical importance. **Neonotonia** is more flexible in this regard, since dehiscense is not a major problem.

With all these species, phosphatic fertilizer is applied at the start of the rains, together with an application of Fusilade where necessary to control grass weeds. Broad leaved weeds are controlled either mannually or mechanically. When the pods are mature, the stand is cut with a reciprocating mower and the cut material is raked into piles in the field. It is then transferred to a hard drying floor where it is spread out in the sun. With the dehiscent species, threshing is usually unnecessary since the seed falls onto the floor and can be swept up after removal of the vines. The **Neonotonia** is passed through a stationary tresher to break the pods. The seed material is then cleaned for storage and distribution.

Leucaena pods are harvested by hand. The pods readily shatter when dried in the sun, and are easily separated from the seed. One pass through the seed cleaner is usually sufficient to remove the small pieces of inert material that are mixed with the seed.

Levels of Production

Data on production of clean seed in 1984-85 are presented in Table 1, together with the estimated production for 1985-86. The figures for the present year are not final since the recent harvests have not yet been cleaned and some of the species will give a further harvest before the closure of the financial year at the end of September.

The quantities of harvested seed of **Leucaena leucocephala** could be greatly increased from existing areas if necessary. Seed of this species is also produced by CARDI in Trinidad where a considerable stock is on hand.

Table 1. Pasture seed production in Antigua, 1984-85 and 1985-86

Species	1984-85 kg.	1985-86 (Estimated) kg.
Grasses		
Panicum maximum (local)	57	120
Panicum maximum cv. Likoni	18	60
Panicum coloratum cv. Bambatsi	3	20
Chrysopogon sp.	45	100
Total grasses	123	300
Legumes		
Leucaena leucocephala Giant K8	75	100
Leucaena leucocephala cv. Cunningham	153	200
Macroptilium atropurpureum cv. Siratro	85	50
Macroptilium atropurpureum Y 61	57	30
Neonotonia wightii cv. Tinaroo and CPI 52614	217	240
Teramnus labialis (both red and black seeded varieties)	45	65
Total legumes	632	685
Total, all species	755	985

Seed Distribution

During the 1984-85 project year, seed was distributed to several countries as shown in Table 2.

Seed of **Leucaena leucocephala** was sent to the Dominican Republic for a development project. Repeat orders of this magnitude are not expected. Almost all of the legume seed sent to other territories was of the herbaceous species **Neonotonia wightii, Macroptilium atropurpureum** and **Teramnus labialis.** The grass seed was divided almost equally between **Chrysopogon** sp. and **Panicum** spp.

In the current year, the principal recipients of seed have been Barbuda, Antigua, St. Lucia, Montserrat and Dominica, altgough seed of both grasses and legumes has been dispatched to St. Croix, U.S. Virgin Islands.

Table 2. Seed distribution (kg) to user countries (1984-85)

Country	Grasses	Legumes	Total
Antigua	54	132	186
Barbados	43	111	154
Dominica	-	18	18
Dominican Republic	-	94	94
Grenada	21	3	24
Guyana	5	8	13
St. Vincent	1	4	5
Trinidad and Tobago	5	29	34
Total	129	399	528

SEED DEMAND

In the past year, several attempts have been made to estimate the regional demand for pasture seed, but these have not been totally successful since some local authorities are either unable or unwilling to provide estimates of likely requirements. The figures that have been supplied are presented in Table 3.

As may be seen from Table 3, expected demand for pastures seed in Barbados is much greater than in the other territories. The demand is for both guinea grass and herbaceous legumes that have been generally successful throughout the region.

In order to fill the demand for pasture seed in the Eastern Caribbean, production must be increased substantially. Amongst the grasses, **Chrysopogon** production is close to filling the present requirements but since this is a new species which is showing considerable promise in the drier areas of Antigua, Montserrat and Nevis, it is likely that the demand will continue to increase over the next few years. Guinea grass seed production is suffiient to satisfy only about 35 per cent of the present requirement, and demand, particularly in Barbados, is expected to increase in the future. A similar picture is seen with the major herbaceous legumes. It is clear that there is great opportunity to increase seed production if the regional demand is to be met from local sources. The range of species for the Eastern Caribbean needs to be extended by the inclusion of pastures suitable for neutral to moderately acid soils such as those of Dominica and St. Lucia. There is presently a small demand for species such as **Brachiaria decumbens** and **Stylosanthes hamata** in the region, while such species should also find acceptance in countries such as Jamaica, Belize and Guyana where soils are much more acid. There is therefore, a potentially large requirement for such species in the Caribbean as a whole.

Table 3. Estimated pasture seed requirements (kg) (1986-87)

Species	Antigua	Barbados	Dominica	Montserrat	St. Lucia	Total
Grasses						
Panicum maximum	46	410	5	38		499
Chrysopogon	92			18		110
Brachiaria decumbens					14	14
Total (grasses)	138	410	5	56	14	623
Legumes						
Leucaena Giant			5		14	19
Leucaena cv. Cunningham	138		5	32	16	191
Macroptilium atropurpureum	92	364	5	80	10	551
Neonotonia wightii	46	364	5		10	425
Teramnus labialis	46	182		60	10	298
Stylosanthes hamata			10	18		28
Stizolobium deeringianum			5	18		23
Total (legumes)	322	910	35	208	60	1535
Total (all species)	460	1320	40	264	74	2158
Per cent of total	21	61	2	12	3	

FUTURE PLANS

In order to satisfy the apparent demand for pasture seed in the Eastern Caribbean, the supply of both grass and legume seed must be doubled, while the range of species must be broadened to take into account the neutral to slightly acid soils in the areas of greater rainfall. At present, some 30 per cent of the arable land at Betty's Hope is sown to pasture species for seed production. Plans are ready to extend the area from its present 14 acres up to about 20 acres, but with the demand for land for other experimental and developmental purposes, no further expansion would be possible at the CARDI Field Station.

While attempts will be made to improve the yields of the established plots, it is doubtful that direct production at Betty's Hope can completely fill the regional demand for pasture seed.

It is hoped that in the near future a small number of local farmers will become involved as contract growers under the technical supervision of CARDI staff. While this would assure the production of sufficient seed to fill the local demand, it presupposes that pasture improvement in the region will become a self-sustaining, commercial practice and that farmers will be prepared to buy seed at its true economic cost of production in order to provide a reasonable financial incentive to the grower. If the seed production scheme is to be placed on a commercial footing, the seed must be sold with a guarantee of its purity and germination. Towards this end, CARDI plans to install a seed testing laboratory in Antigua. Seed produced by out-growers would be bought, cleaned, analyzed, packaged, sold and distributed by CARDI who would also guarantee that its purity and germinative ability compared favourably with internationally accepted quality standards. In this way, the demand for seed for neutral to alkaline soils in the region should be satisfied.

Although still at a preliminary stage, plans are also being made to produce large quantities of seed for acid soils. There is a large potential demand for this seed, not only in CARICOM countries such as Guyana, Belize, Jamaica and Trinidad, but also in Central and South America. These plans would call for the setting up of a new centre dedicated to the purpose. It is planned to have a nucleus under direct CARDI control, together with contracted out-growers under CARDI technical supervision as the scheme develops. A project has been prepared and submitted to EDF for possible funding. If it is approved, it is hoped that CARDI will be in a position, by the end of the present decade, to assure the supply of good quality seed of recommended pasture varieties, not only to the CARICOM region, but to the whole of the area of the Caribbean.

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