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VIABILITY OF PARA GRASS (BRACHIARIA MUTICA) SEED AND THE EFFECT OF FERTILIZER NITROGEN ON SEED YIELD

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SUMMARY

The application of nitrogenous fertilizer significantly increased both the number of reproductive tillers and the yield of harvestable seed of para grass. There was no response to phosphate nor any N x P interaction.

At the completion of general anthesis, mean seed yields of 11·86, 22·37 and 27·53 lb/ac were realized for nil, 50 and 100 lb nitrogen per acre treatments respectively.

The species is functionally fertile in the humid tropics of North Queensland and correctly harvested seed has a high viability. Germination was not influenced by fertilizer treatments.

Mean percentage germination for all treatments ranged from 51 to 57% and full caryopsis content ranged from 75 to 77% at the stage of ripeness that gave maximum yields of seed.

I. INTRODUCTION

Para grass (*Brachiaria mutica* Stapf) has a wide application in the frost-free coastal districts of North Queensland which receive 50 in. or more rainfall annually, and ready availability of seed of high germinating capacity would be of great practical value.

In the literature, para grass is often referred to as a partially sterile, poor seed-producing species, generally propagated by vegetative means (Whyte, Moir, and Cooper 1959). Though para grass flowers in southern Queensland, it is only in the tropics that flower heads and seeds are produced in profusion (Officers of the Agriculture Branch 1954). This phenomenon would suggest that normal seed-setting of para grass is restricted to low latitudes and humid tropical environments.

The problems associated with the production of viable seed of para grass, seeding characteristics, optimum time of harvesting and effect of fertilizer on seed yield were studied at South Johnstone (latitude 17° 36′ S.), in the "wet belt" of North Queensland.

II. METHODS AND MATERIALS

Nitrogenous and phosphatic fertilizers, in the form of commercial urea (46% N) and superphosphate (22% P_2O_5), were applied to a 2-year-old sward of para grass. The nine treatment combinations comprising incremental rates of N and P_2O_5—viz. nil, 50 and 100 lb N and nil, 50 and 100 lb. P_2O_5 per acre—were arranged in four blocks, completely randomized.

The fertilizers were applied following rotary mowing of the grass stand to a uniform height of 6 in. on January 6, 1966, approximately 3 months prior to the expected seeding of para grass.

The first emerged inflorescence was observed on March 17, and from this date the inflorescences were counted weekly in each treatment in sub-plots measuring 10 lk x 18 lk.

General anthesis occurred during the third week. Seed harvesting was carried out at the end of the third week and in the sub-plots 1 week later. The inflorescences were cut by hand and threshed, and seed samples were recleaned with a miniature grader/winnower.

An international method of purity determination, based on separation by air blast, was employed. Here, the percentage purity refers to fully developed seeds contained in the samples. This method was developed for para grass seed by the Standards Branch of the Queensland Department of Primary Industries (E. T. Prondonoff, Queensland Department of Primary Industries, unpublished records).

III. RESULTS

Figure 1 illustrates emergence and number of inflorescences. Inflorescences emerged progressively over a period of 21 days, when they reached a maximum; by then, general anthesis was also completed. Anthesis is a cyclic event in para grass, starting early in the morning and finishing by noon, to be repeated in other florets of the same inflorescences 24 hr later. The number of inflorescences remained static between the third and fourth weeks.

Both levels of nitrogen increased the number of reproductive tillers as recorded by the number of emerged inflorescences. The response to the increasing rate of nitrogen used was curvilinear and the nitrogen effect on the number of emerged inflorescences per unit area was highly significant ($P<0{\cdot}01$) for all dates. There was no response to superphosphate, nor was there a measurable interaction between nitrogen and phosphate.

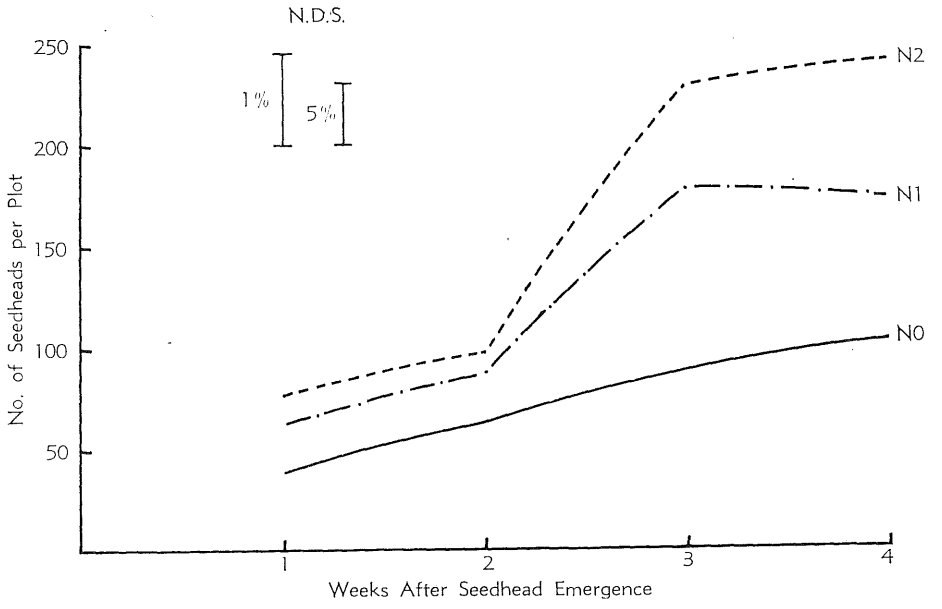

Figure 1.—Mean number of emerged para grass inflorescences and effect of nitrogenous fertilizer on the number of inflorescences per plot of 10 lk x 18 lk.

The yields of clean seed at both harvesting dates showed a highly significant response ($P<0\cdot01$) to an application of 100 lb N per acre, with insignificant differences between the levels of nitrogen applied (Table 1). The effect of the 50 lb N treatment was significant ($P<0\cdot05$) at the first and highly significant at the second harvesting date. Phosphate application did not influence seed yield. No interactions were recorded between the nitrogen and phosphate treatments.

TABLE 1

EFFECT OF NITROGEN ON YIELD OF PARA GRASS SEED

Level of Nitrogen (lb/ac)	Mean Yield (lb/ac)	
	Harvest I 6.iv.1966	Harvest II 13.iv.1966
0	11·86	6·29
50	22·37	11·19
100	27·53	12·21
Necessary differences for 5% significance	8·45	3·38
1%	11·45	4·58
	50>0	50, 100⩾0
	100⩾0	

At the first harvesting date there was no evidence of seed-shattering and the yields realized represent the full seed crop that was obtainable under the conditions of the trial (Figure 2).

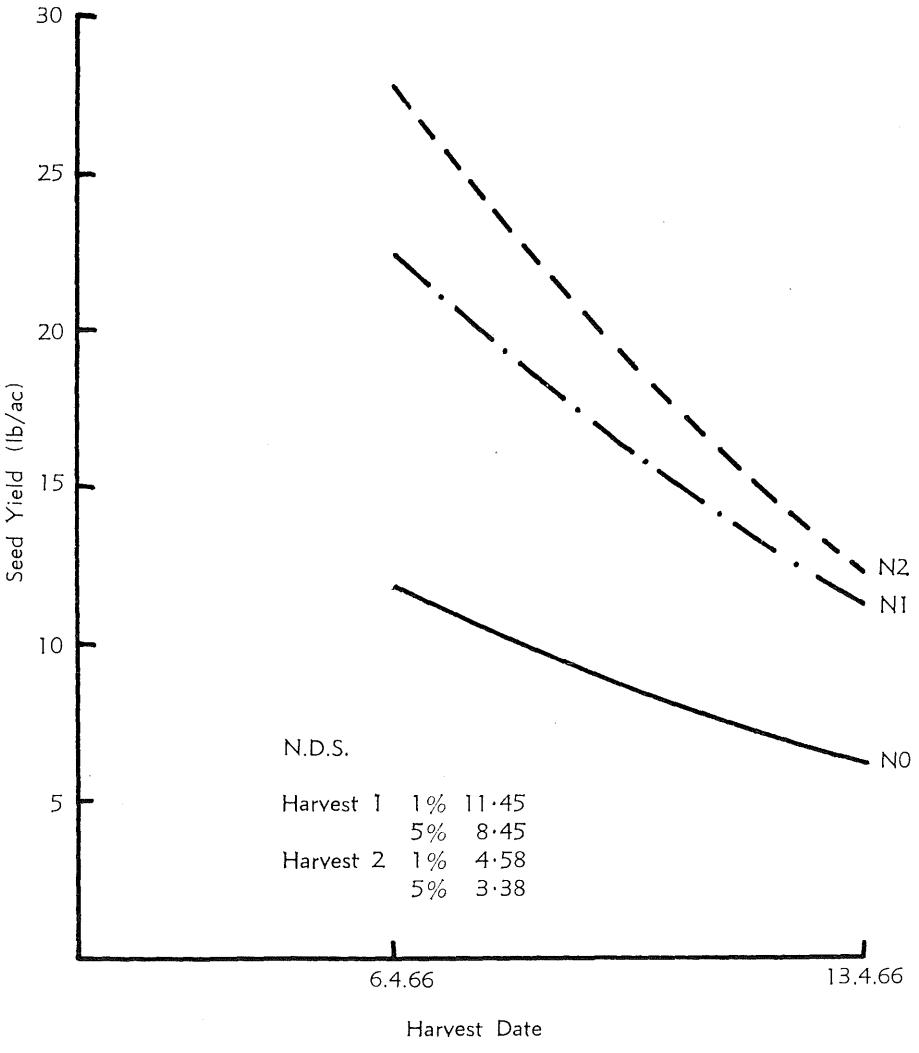

Figure 2.—Seed yields of para grass at the first and second dates of harvest.

At this stage, when general anthesis was completed, the inflorescences appeared to be still green and the seed immature. However, delaying the harvest for another week resulted in heavy losses of full caryopses, reducing the harvestable yields by 47, 50 and 55·6% in the nil, 50 lb N and 100 lb N treatments respectively.

In spite of the immature appearance of inflorescences and seed at the first harvesting date, the mean percentage germination recorded after two month's storage ranged from 51 to 57% for the various treatments (Table 2).

TABLE 2

GERMINATION AND PURITY PERCENTAGES OF PARA GRASS SEED

Treatment*	Harvest I		Harvest II	
	Germination Mean (%)	Purity Mean (%)	Germination Mean (%)	Purity Mean (%)
N0P0	52·8	76·3	34·3	78·0
N0P1	63·5 } 57	79·0 } 77	36·5 } 31	75·1 } 76
N0P2	55·0	75·5	21·8	74·5
N1P0	57·8	78·8	38·5	77·6
N1P1	47·0 } 53	69·4 } 75	31·5 } 38	71·8 } 78
N1P2	53·3	78·9	44·3	82·5
N2P0	64·3	90·6	48·5	85·6 ×
N2P1	47·3 } 51	73·9 } 77	41·3 } 40	85·5 } 83
N2P2	43·3	69·0	29·5	77·5

* N0, nil nitrogen — P0, nil P_2O_5
N1, 50 lb N per ac — P1, 50 lb P_2O_5 per ac
N2, 100 lb N per ac — P2, 100 lb P_2O_5 per ac

IV. DISCUSSION

In view of the high standards of purity and germination, the yields of 22·4–27·5 lb of recleaned para grass seed per acre obtained in response to nitrogenous fertilizer at the first harvest are considered quite acceptable for a tropical grass.

Nitrogen exerted its effect on seed yield mainly through increasing the number of reproductive tillers and inflorescences. A further effect of nitrogen was that a greater number of inflorescences of uniform ripeness was present at harvesting.

It was also indicated that the seed of para grass has no post-harvest dormancy and freshly harvested seed will germinate quite readily.

The practical implications of the results are that, to obtain optimum yields, para grass seed should be harvested within the week in which general anthesis is completed. This can be done without affecting the viability of the seed.

The glumes enclosing the caryopsis of para grass are light and do not clasp the caryopsis tightly, so a delay of harvesting at the specified stage of maturity will result in heavy losses of seed.

V. ACKNOWLEDGEMENTS

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