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The Effect of Planting Density and Supports on the Seed Yield of *Mucuna cochinchinensis*

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RINGKASAN

Mucuna cochinchinensis *telah ditanam untuk penghasilan bijibenih dengan menggunakan enam sistem penanaman. Sistem-sistem tersebut merupakan kombinasi dari dua jarak tanaman iaitu 1.0 m x 1.0 m dan 2.0 m x 2.0 m dengan tiga jenis junjung iaitu tiada junjung, junjung dengan sebatang kayu secara individu dan junjung secara trellis dawai.*

Tanaman yang diberikan kedua-dua jenis junjung itu memperolehi hasil bijibenih yang lebih daripada tanaman tanpa junjung. Hasil min bijibenih normal untuk tanaman tanpa junjung, junjung secara individu dan junjung jenis trellis dawai ialah 76, 677 dan 736 kg/ha. Hasil yang rendah bagi tanaman tanpa junjung itu adalah akibat daripada jumlah hasil bijibenih yang rendah dan tingginya peratus bijibenih yang busuk. Bijibenih busuk adalah setinggi 68 peratus untuk tanaman tanpa junjung berbanding dengan 38 peratus untuk tanaman yang dijunjung secara individu dan 33 peratus untuk yang dijunjung secara trellis. Tidak ada perbezaan yang berkeertian antara dua jenis junjung yang digunakan.

Jarak tanaman tidak memberi kesan yang berkeertian kepada hasil bijihbenih pada keseluruhannya. Tetapi untuk tanaman tanpa junjung peratus bijibenih busuk untuk jarak tanaman yang rapat (78%) adalah lebih daripada untuk jarak tanaman yang jauh (54%).

SUMMARY

Mucuna cochinchinensis *was planted for seed production using six planting systems. These comprised combinations of two planting distances; 1.0 m x 1.0 m and 2.0 m x 2.0 m with three types of supports; no support, individual pole support for each plant or the wire-trellis type of support.*

Plants using either type of support outyielded the seed production from plants which received no support. Mean yield of normal seeds for unsupported plants, plants with individual support and plants with the wire trellis type of support were 76,677 and 736 kg/ha respectively. The lower yield of normal seeds from unsupported plants resulted from a combination of a lower total seed yield and a higher percentage of rotten seeds. Rotten seeds in unsupported plants comprised 68 percent of total seed yield compared to 38 percent and 33 percent for individually supported and wire-trellis supported plants respectively. Differences between the two types of supports were not significant.

Planting distance did not have a significant effect on seed yield. However, for plants without any support there was a higher percentage of rotten seeds (78%) for the more closely spaced plants than for plants planted at the wider spacing (54%).

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INTRODUCTION

Mucuna cochinchinensis is an annual legume which is becoming popular as a cover crop in rubber and oil palm plantations in the country. It spreads itself faster and grows more vigorously than the other commonly used legume covers (Tajuddin *et al.* 1980). It also has the advantage of seeding readily in this country unlike the other legume covers where the supply of seeds relies heavily on importation (Yeoh and Phang 1980).

With the projected increase in demand for this legume it is important to ascertain the best agronomic practice for seed production. Previous work have shown that seed yields of up to 726 kg/ha can be obtained (Chee *et al.* 1980). However, in some locations seed yield was as low as 173 kg/ha. It was explained that plants which had some form of support gave higher seed yields than unsupported plants, but no comparisons within one location have been carried out.

The current work is aimed at comparing seed yields between supported and unsupported plants under uniform conditions. In addition, the effect of two planting densities on seed yield is also investigated.

MATERIALS AND METHOD

The experiment was carried out on a Serdang series soil (Typic Paleudult) at the Agronomy Research Area of the Universiti Pertanian Malaysia. The experimental design was a randomized complete block with four replications. There were six treatments consisting of combinations of two factors viz: –

1. Planting Distance: – i) 1.0 m x 1.0 m
   ii) 2.0 m x 2.0 m
2. Supports : – i) no support
   ii) individual pole support
   iii) wire-trellis support (Fig. 1).

There were a total of 24 plots of size 4 x 4 m and each plot was spaced 2 m away from adjacent plots. Three seeds were planted at each planting point and after two weeks each point was thinned to leave only one plant per planting point. The basal fertilizer used was Nitrophoska Blue Special (12%N, 12% P_2O_5 17% K_2O plus trace elements) which was applied at the rate of 0.3 kg per plot (18.5 kg/ha).

Supports

The supports for the relevant treatments were erected by the sixth week after planting. The individual pole support consisted of a wooden pole 183 cm long of which 36 cm was driven into the ground at each planting point. Each plant was trained to climb around this support. The wire-trellis support consisted of two lengths of wires stretched from wooden poles across each plot at each planting row (Fig. 1). The upper wire was at a height of 120 cm and the lower at 60 cm from ground level Treatments with the closer planting distance had five such rows while the other had three.

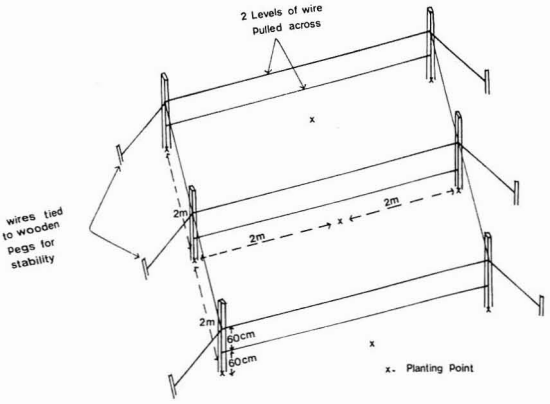

Fig. 1. The trellis support for the 2.0 m x 2.0 m planting distance.

Harvesting

At each harvest mature pods, as identified by their darker colour and shrinkled texture, were plucked from each plot. Harvesting was carried out at intervals of 3 – 4 days. The pods were dried in the sun for four days and the seeds were collected after cracking the pods with a hammer. Seeds of regular shape, colour and size, with smooth seed coat and free from signs of fungal or insect attack were classified as normal seeds. Otherwise, they were considered as abnormal seeds.

RESULTS AND DISCUSSION

Ripe pods began to appear about seven months after planting. The total seed yield (normal and abnormal seeds) for treatments without support, individual support and wire-trellis support were 243, 1066 and 1095 kg/ha respectively. Total seed yields were about four and a half times higher in plants which had either form of support compared to those without support (Table 1).

TABLE 1
Total Seed Yield (kg/ha)

Support	Planting Distance 1m x 1m	2m x 2m	Mean (supports)
Nil	192	294	243[a]
Individual	1064	1067	1066[b]
Trellis	1137	1055	1096[b]
Mean (P. Distance)	798[a]	805[a]	

(Means with similar subscripts within each row or column are not significantly different P = 0.01, Duncan's Multiple Range Test).

TABLE 2
Yield of Normal Seeds (kg/ha)

Support	Planting Distance 1m x 1m	2m x 2m	Mean (supports)
Nil	37	120	79[a]
Individual	736	618	677[b]
Trellis	768	704	736[b]
Mean (P. Distance)	514[a]	481[a]	

(Means with similar subscripts within each row or column are not significantly different P = 0.01, Duncan's Multiple Range Test).

TABLE 3
Percentage of Abnormal Seeds

Support	Planting Distance 1m x 1m	2m x 2m	Mean (supports)
Nil	78	54	68[a]
Individual	32	43	38[b]
Trellis	32	34	33[b]
Mean (P. Distance)	47[a]	45[a]	

(Means with similar subscripts within each row or column are not significantly different P = 0.01, Duncan's Multiple Range Test).

The yields of normal seeds alone were 76, 677 and 736 kg/ha for the unsupported plants, individually supported plants and wire-trellis support plants respectively. Hence the yield of normal seeds from supported plants was approximately nine times that of the unsupported plants (Table 2).

It can be seen that the higher yield of normal seeds for supported plants was a consequence of a higher total seed yield and a lower percentage of abnormal seeds. The percentage of abnormal seeds for unsupported plants was 68, while those for the individual and wire-trellis supported plants were 38 and 33 per cent respectively (Table 3).

The differences in yields may be attributed to the fact that the supported plants had an apparently bigger surface area available for growth than was available to the unsupported plants. Self shading in the unsupported plants reduced the growth rate and production of flowers. Pods that were formed on unsupported plants were in close contact with the moist soil surface and the poorer aeration under such conditions encouraged fungal growth. Hence there was a higher proportion of abnormal seeds in unsupported plants.

Differences in seed yield between the two forms of support were not significant. However, it was easier to harvest the seeds with individual supports because of the better accessibility to the plants in the middle of the plot. The wire-trellis form of support with the wires stretched across the plot made it difficult to reach the centre of the plot.

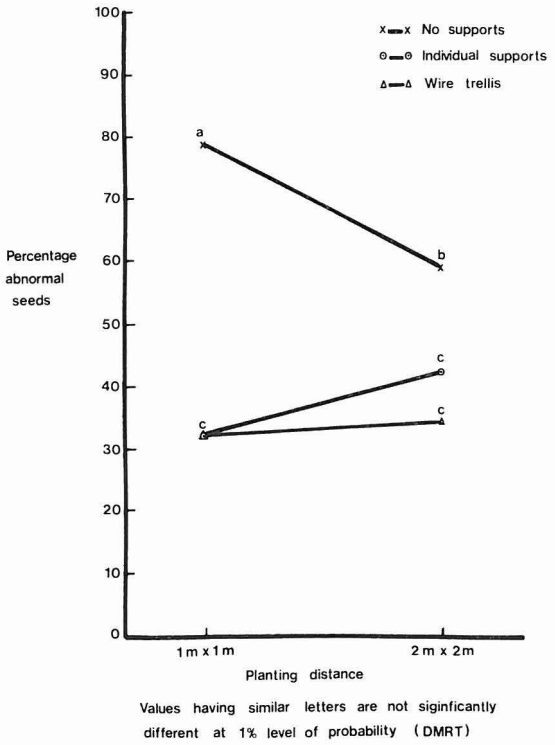

Fig. 2. Interaction between planting distance and supports on percentage of abnormal seeds.

Planting distance did not have a significant overall effect on seed yield. However, for the unsupported plants the closer planting distance significantly increased the percentage of abnormal seeds. There was about 78 percent abnormal seeds for plants spaced at 1.0 m x 1.0 m and only 54 percent for those spaced at 2.0 m x 2.0 m (Table 3 and Fig. 2). This indicated that the dense conditions under the closer planting distance resulted in a higher incidence of seed damage by fungus and other pathogens. Plants which had supports did not show this effect because of the better aeration.

CONCLUSION

The nine-fold gain in the yield of normal seed from supported plants suggests that supports should be used in the seed production of *Mucuna cochinchinensis*. The extra cost in putting up the supports will be outweighed by the gain in seed yield.

The type of support has little influence on seed yield. The choice of support would thus depend on factors such as cost of materials, ease of construction and ease of harvesting.

A planting distance of 2.0 m x 2.0 m seems to be adequate for seed production. No advantage can be derived from using the closer planting distance which, on the contrary, may involve a higher cost for seeds and supports.

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