EFFECT OF PLANTING MATERIAL AND HARVESTING TIME ON SEED PRODUCTION OF *ARACHIS PINTOI* IN MALAYSIA

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ABSTRACT

A study was conducted at Bukit Tangga MARDI Research Station to determine the effect of planting material and harvesting time on seed production of *Arachis pintoi* cv. Amarillo. Arachis was established from seed and stolon and harvested at 6, 12, 18, 24 months after establishment. Pod (seed-in-pod) yields of about 1256 and 1258, 1244 and 1190 kg/ha were obtained from 18- and 24-month harvest, planted from seed and stolon, respectively. Harvest earlier gave lower pod yield for both planting materials. Pod yield at 6- to 12-month harvest showed a difference when compared with 18- to 24-month harvest for both planting materials. There was not much difference in pod yield harvested at 18-24 months between the two planting materials.

The mean 100-pod and 100-kernel weight were higher in planting from seed than stolon. Purity varied from 36 - 65 %. Germination of the pod showed a decrease with storage exceeding 6 months. Flowering pattern in relation to rainfall distribution, shoot yield and root yield as affected by harvesting time were also discussed.

INTRODUCTION

Arachis pintoi cv. Amarillo, a stoloniferous perennial legume, is a high quality forage suitable for mixed pasture for grazing animal (Carulla et al 1991) and as ground cover in horticulture (Dwyer et al 1989). It yielded about 3 t/ha/yr in full sunlight at Serdang (Wong, C.C.-personal communication) and survived well under rubber with 53% light transmission (Ng 1990). Its origin, morphological description, agronomic characters and management has been well described (Cook *et al*. 1990; Cook, 1992).

Being a low-growing and ground cover species, Amarillo is more readily grazed than hand-harvested. It has good attributes for persistence in grazed pastures as it has a prostrate growth habit, perennial crowns, set seed under grazing and is able to root from stolons (Jones 1993).

Planting from seed is generally simpler and more acceptable to farmers. If seed is not available it can also be propagated vegetatively from stolons. This paper intends to determine the seed production of A. pintoi cv. Amarillo as affected by planting material and harvesting time.

MATERIALS AND METHODS

The experiment was conducted at MARDI Bukit Tangga Research Station in the northern part of Peninsular Malaysia in 1992/1994. The mean annual rainfall was about 1830 mm with 3-4 months dry period starting from December to April annually. The soil pH varied from 6.0 to 5.5 with soil depth.

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The treatments were two planting materials, from seed and from stolon and four harvesting times, 6, 12, 18 and 24 months post establishment. *A. pintoi* cv. Amarillo seed was provided by Forage Seeds Project (CSIRO/CIAT) whereas stolon was obtained from germplasm nursery at MARDI Serdang. The planting materials were inoculated with Rhizobium inoculant CB 3101 before planting. Planting was done in late August 1992 in plots 3 m x 3 m with three replications.

Basal fertiliser of 30 kg P/ha as Triple Super Phosphate and 30 kg K/ha as muriate of potash was applied prior to planting. Weeding was carried out when necessary. Flower count was done after 4 weeks of sowing by fixing two quadrat positions of 0.3 x 0.3 m pegging out at random in each plot and count was done every 10 days until harvest. Harvesting was done in Feb, Aug. 1993 for 6- and 12-month harvest and Feb, Aug. 1994 for 18- and 24-month harvest. For pod (seed-in-pod) yield determination, all top growth was removed by cutting prior to harvest. The plot was then hoed to a depth of 8 to 10 cm and the soil was manually shovelled into 3-cm mesh screen and loosened by flowing water to allow the pods to pass through and further seived using 1-cm mesh screen. The pods were hand-sorted to separate from materials of similar size. The sorted pods were then cleaned with water and dried under the sun for two hours daily for three days. The dry matter yields of shoot and root at harvest were also recorded. The cleaned pods were sampled for seed quality determination and germination test.

RESULTS AND DISCUSSION

Pod yield

Pod yield of about 1256 kg/ha was obtained at 18-month harvest when planted from seed. Lower pod yield of 1031 and 234 kg/ha was obtained at 12-month and 6-month harvest (Table 1) . The lower yield was due to high proportions of immature pods and newly developed pods. However, delay in harvest did not give much difference in yield (1285 kg/ha). Similar trend was obtained in planting from stolon (Table 1). The mean pod yield was higher when planted from seed (952 kg/ha) than stolon (816 kg/ha). The difference in pod yield was obvious when seed was harvested between 6-12 months post establishment (Table 1). Harvesting of seed at 18-24 months post establishment did not show much difference between both planting materials. Cook and Franklin (1988) recommended that it may be economical to harvest crop every second year (24 months).

Ferguson (1994) obtained pod yield of 150-250 kg/ha when planted from stolon and 1720-1880 kg/ha when planted from seed (10 kg/ha) and harvested at 18-30 months post establishment in the Eastern Plain of Colombia. Pod yield of Amarillo in various countries using a range of manual and mechanical methods range from 1 to 5 tons/ha but mostly from 1 to 2 tons/ha at 14-18 months post establishment (Ferguson 1994). The yield obtained in this study was consistent with that obtained by Ferguson. Stur and Ndikumana (1994) recorded pod yields of 1060 kg/ha at 14 months after establishment at Los Banos, Philippines. The mean pure pod yield obtained in this study was 511 and 459 kg/ha for both planting materials, respectively (Table 1).

The mean shoot and root yield at harvest when planted from seed and stolon did not show much difference (Table 1). However, a study at Puerto Lopez, Colombia showed that a pure stand established from seed gave a lower shoot yield but much higher pod yield (Ferguson 1994).

Table 1. Effect of planting material and harvesting time on pod and pure pod yield, dry matter yield of shoot and root of *A. pintoi* at Bukit Tangga, Kedah

Planting material	Harvesting time	Total pod yield (kg/ha)	Total* pure pod yield (kg/ha)	Shoot yield (t/ha) (t/ha)	Root yield
Seed	6	234	119	1.8	1.2
	12	1031	464	5.2	3.0
	18	1256	779	5.9	1.9
	24	1285	681	4.6	2.8
Mean		952	511	4.4	2.2
Stolon	6	147	78	1.3	1.6
	12	682	246	4.7	2.4
	18	1244	808	5.7	2.5
	24	1190	702	7.0	2.8
Mean	816	459	4.7	2.3	

* Total pod yield x % purity

SEED QUALITY

The highest 100-pod weight was 16.1 and 15.1 in planting from seed and stolon, respectively, when harvested at 18 months post establishment. Their respective kernel weight was 11.5 and 11.0 g (Table 2). The mean 100-pod and 100-kernel weight was higher in planting from seed than stolon. Percentage of seed purity of seed ranged from 36 to 65 % in both planting materials (Table 2). The low percentage purity was mainly due to damaged pod, inert matter and immature pod which contributed about 2-12, 3-17 and 1-6%, respectively, for both planting materials. Higher immature pod was observed in 6- and 12-month harvest for both planting materials. Harvesting of seed at correct time using appropriate harvesting techniques may increase seed availability. Based on mean 100-pod weight, it is estimated that there was about 6800 to 7400 of seeds per kg. Normally, seed number ranges from 6000 to 8000 pod per kg (Cook et al 1990).

Table 2. Effect of planting material and harvesting time on seed quality of *A. pintoi* at Bukit Tangga, Kedah

Planting material	Harvesting time	100-pod weight (g)	100-kernel weight (g)	Purity (%)
Seed	6	12.5	9.2	51
	12	15.1	9.6	45
	18	16.1	11.5	62
	24	15.1	11.1	53
Mean		14.7	10.4	53
Stolon	6	12.5	8.8	53
	12	10.9	6.5	36
	18	15.8	11.0	65
	24	14.9	10.7	59
Mean		13.5	9.3	53

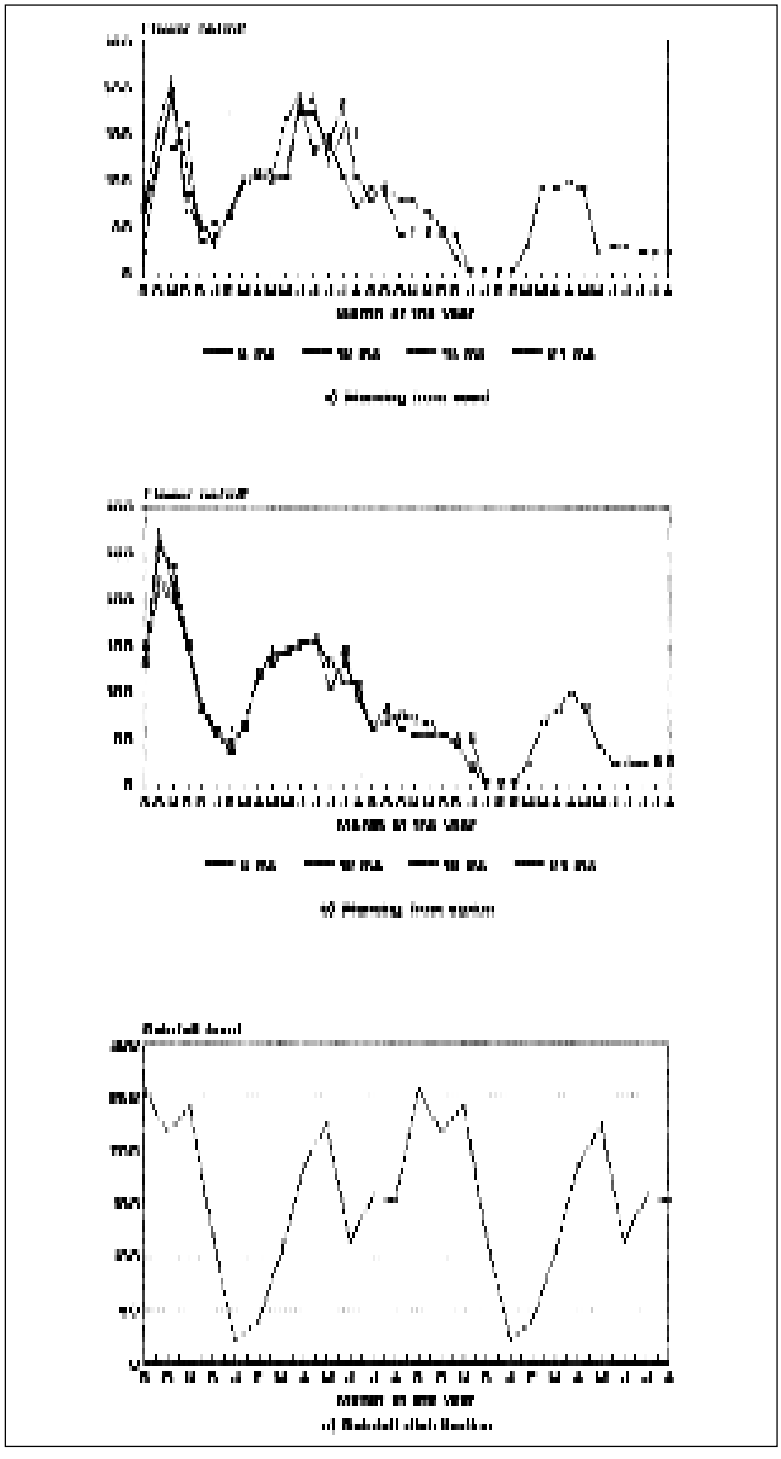

Figure 1. Relationship between flower no. of A. pintoi and rainfall at four harvesting times in 1993/1994

FLOWERING PATTERN

Flowering commenced three to four weeks after establishment and flowering seemed to respond to rainfall distribution, being lowest or almost nil during the dry season (Jan-Feb 1993/94) (Figure 1). The highest number of flowers was observed during rainy season for both planting material (Figure 1). The highest number of flower/m^2 of about 200 was recorded in Nov 1992 when planted from seed and about 272 recorded in Oct 1992 when planted from stolon. The lowest and almost nil was in Jan-Feb in 1993/94. The mean peg length measured was about 8.3 in planting from seed and 8.4 from stolon.

SEED GERMINATION

Freshly harvested seed gave 13.0% of germination. When kept for 6 months in air-conditioned room at 21°C, the germination was 70%. The germination percentage started to decrease when kept more than 15 months (Table 3).

Table 3. Germination % of A. pintoi as affected by storage

Storage (month.)	Germination (%)
Fresh seed	13
6	70
12	60
15	50
18	0

CONCLUSION

Results obtained in this study showed that Arachis pintoi seed could be produced in the northern part of Peninsular Malaysia. Planting from seed or stolon has to be harvested in between 18-24 months post establishment to obtain high yield of good quality seed. Studies on harvesting techniques and equipment and proper storage method needs further investigation.

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