

Harvest maturity of groundnut variety MKT1 for seed production

(Peringkat penuaian kacang tanah varieti MKT1 untuk biji benih)

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Key words: harvest dates, moisture content, germination, 100-seed weight, seedling dry weights

Abstrak

Kajian dijalankan untuk menentukan peringkat penuaian yang paling sesuai bagi kacang tanah MKT1 untuk biji benih. Lenggai dituai selang 10 hari, mulai 90 hari sehingga 130 hari selepas penanaman. Hasil daripada analisis statistik menunjukkan bahawa penuaian pada hari ke-90 memberikan bilangan lenggai muda dan berat biji muda yang paling tinggi daripada penuaian yang terkemudian. Bagaimanapun, tiada perbezaan yang ketara dalam bilangan lenggai matang dan berat biji matang pada semua peringkat penuaian. Penuaian pada hari ke-90 memberikan kandungan lembapan biji benih yang paling tinggi, berat 100 biji yang paling rendah dan berat anak benih yang paling rendah. Percambahan biji benih daripada penuaian pada hari ke-90 hingga ke-100 melebihi 80%. Hasil biji benih dalam lenggai tidak berbeza secara ketara antara penuaian pada hari ke-90, ke-100 dan ke-110, tetapi hasil berkurangan kemudian. Dengan ini, penuaian untuk biji benih hendaklah dilakukan pada 100–110 hari selepas penanaman.

Abstract

Studies were carried out to determine the optimum stage to harvest groundnut MKT1 for seed. Pods were harvested at 10-day intervals, beginning from 90 to 130 days after sowing. Statistical analysis showed harvest from the 90th day gave the highest number of immature pods and weight of immature seed than later harvests. However, there was no significant difference in number of mature pods and weight of mature seed at all harvest dates. Harvesting on the 90th day gave highest seed moisture content, lowest 100-seed weight and lowest seedling weights. Seed from harvests of the 90th, 100th and 110th day had germination above 80%. Seed (in pod) yields from harvests on the 90th to 110th day did not differ significantly; however yield was lower from later harvests. Thus, harvesting for seed should be done at 100–110 days after planting.

Introduction

Groundnut variety MKT1 is the result of a cross between Early Bunch (Virginia) and Matjam (Spanish) varieties. It has been released by MARDI to replace Matjam which has smaller seed. However, seed of

MKT1 seemed to take a longer time to mature than those of Matjam. For high-quality seed production, it is important to harvest the pods at the optimum time. Harvesting dates have been shown to influence yield and quality of groundnut

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seed (Sombatsiri and Nuan 1987; Mozingo et al. 1991). Seed attains maximum dry weight at the point of physiological maturity. At this point, the seed would also be at its highest vigour and hence its maximum germination capacity.

Matjam is normally harvested at 100 days after planting for good quality seed. However, information on optimum harvest maturity of variety MKT1 is not available. Some groundnut farmers harvest their seed crops as early as 90 days after sowing.

This investigation was carried out to study the effects of different harvest dates on seed quality and yield, and consequently to determine the optimum harvest stage for seed production of groundnut MKT1.

Materials and methods

Seed of groundnut variety MKT1, obtained from foundation seed stock, was field planted at MARDI Gajah Mati (20 plots) on 20 February 1991 and at MARDI Serdang (16 plots) on 18 March 1991. Seed was sown in 5 m x 5 m plots with four replications in RCBD. There were five harvestings in Gajah Mati and only four in Serdang. Planting distance was 50 cm x 20 cm. Fertilizer (N, P₂O₅, and K₂O) at the rate of 34:56:56 kg/ha was applied twice at 15 days after sowing and at flowering. Insect pests and diseases were controlled by spraying appropriate chemicals when necessary. Weeds were controlled by spraying pre-emergence weedicides as well as by manual weeding.

Harvesting was carried out at 10-day intervals, beginning on the 90th day until the 130th day after sowing at Gajah Mati, and until 120th day at Serdang. Ten plants were randomly taken from each plot for data collection on number and weight of mature and immature pods, and seed. The total pod yield of each plot was also taken. All these data were collected from trial site at Gajah Mati only. Other data, including seed moisture content, seed germination, 100-seed weight and number of germinated seed in the field, were collected from both trial

sites at Gajah Mati and Serdang. Mature and immature pods were determined by visual characteristics such as colour and fleshiness of the hull, colour of the inner pericarp and seed coat. A mature pod has a yellow hull, light brown inner pericarp while the mature seed has a pinkish white seed coat. An immature pod by contrast has a white hull, inner pericarp as well as seed coat. The immature seed is imbedded in white fleshy materials in the hull while the mature seed no longer attaches to the hull. Seed moisture content was determined by oven drying at 105 °C for 24 h. Standard germination tests were conducted in sand media at room temperature using 400 seed, randomly taken in four replications. Germination percentage was determined at 10 days after sowing and evaluated according to ISTA rules (Anon. 1985). The dry weight of the seedling was determined after drying 10-day-old seedlings at 70 °C for 72 h. The data were analysed using analysis of variance (ANOVA) and comparison of means by the LSD test.

Results and discussion

Earlier harvests produced more immature pods and seed compared with later harvests in the variety tested. Results in *Table 1* show that there were significant differences in the number of immature pods and weight of immature seed between the different harvest dates. The number of immature pods and weight of immature seed were highest in the first harvest i.e 90 days after sowing. On the other hand, there was no significant difference in mature pod numbers or weight of mature seed between the different stages of harvest.

Results on various aspects of seed quality are presented in *Table 2*. The number of germinated seed in the field increased when harvest was delayed. A sudden increase in germinated seed after the 120th day harvest was observed in Serdang. In Gajah Mati, the increase in field germination was gradual. However, seed germination is dependent on the availability of water. Thus, the occurrence of rainfall

Table 1. Effect of harvest dates on number of pods and weight of seed of groundnut variety MKT1 (Gajah Mati Station)

Days after sowing	No. of pods/10 plants		Seed weight (g/10 plants)	
	Immature	Mature	Immature	Mature
90	255a	367a	50.60a	175.14a
100	188ab	275a	31.48ab	162.05a
110	174b	277a	13.06b	193.94a
120	195ab	366a	23.65b	233.66a
130	232ab	319a	29.45b	228.17a

Mean values with the same letter in the same column are not significantly different from one another according to the LSD test $p = 0.05$

Table 2. Effect of harvest dates on seed quality

Location	Days after sowing	No. of seed germinated in the field	Seed moisture (%)	100-seed weight (g)	Seed germination (%) in the laboratory	Seedling dry weight (g)
Gajah Mati	90	3	46.4a	37.5b	96.0a	3.3c
	100	13	39.3b	49.1a	86.0b	4.5b
	110	17	36.0bc	48.9a	86.5b	4.3b
	120	39	36.8bc	52.2a	82.0b	4.5b
	130	75	34.5c	52.8a	85.9b	5.6a
Serdang	90	1	47.7a	44.0b	96.5a	3.7c
	100	2	36.2b	51.2ab	97.8a	5.6a
	110	7	39.5b	54.0a	98.0a	4.6b
	120	21	35.8b	54.0a	89.8b	5.1ab
	130	—	—	—	—	—

Mean values with the same letter in the same column for each location are not significantly different from one another according to the LSD test ($p = 0.05$)

could also give rise to sudden increases in the number of germinated seed while still on the plant. In the case of groundnut, the minimum moisture content required to initiate germination is 35% (Golakiya 1989). Thus, light rainfall is sufficient to initiate germination of the seed.

The seed moisture content was significantly highest when harvested at 90 days after sowing. The moisture content at this stage was about 47%. The general trend showed decreasing seed moisture content with time, although the differences were not significant except for the sample on the 130th day at Gajah Mati.

The 100-seed weight was used to give an estimation of the dry matter accumulation. There is no significant change in 100-seed weight for seed harvested from

100 to 120 or 130 days in both trials. However, seed harvested on the 90th day showed the lowest 100-seed weight (Table 2), being 37.5 g at Gajah Mati and 44.0 g at Serdang. Thus, seed from the earlier harvests have less dry matter and higher moisture content. This result is in agreement with those obtained for seedling dry weight. Seedlings from the 90th day harvest were significantly lighter than seedlings from later harvests. The dry weights per 10 seedlings at this stage were 3.3 g and 3.7 g from Gajah Mati and Serdang respectively. Thus, seed with less dry matter accumulation produced smaller and less vigorous seedlings. Varman et al. (1990) stated that dry matter production and pod yield of groundnut were positively correlated with 100-seed weight, and that

the highest pod yield was obtained from the largest seed.

For samples from Gajah Mati, the harvest on the 90th day resulted in significantly higher seed germination as compared with other harvest dates (*Table 2*). However, the difference is not critical as all the seed from all harvest dates had a germination rate of above 80%. Though there was no significant difference in germination between 90-day and 110-day harvest for samples from Serdang, seed harvested on the 120th day gave significantly lower germination.

Results on yield at Gajah Mati are shown in *Figure 1*. There were no significant differences in the yields between harvests from the 90th day and from the 120th day. However at 130 days after sowing, the yield dropped significantly. The yields obtained were 6.80 kg/plot on the 90th day and 5.52 kg/plot on the 120th day.

From the results, it can be concluded that harvesting of groundnut variety MKT1 for seed can be carried out from 90 days to 110 days after sowing. However, after considering drying and seed quality aspects, the optimum harvest date would be between 100 and 110 days after sowing. Although high yield was also obtained at 90 days after planting, seed size was smaller and would more likely result in smaller seedlings. Furthermore at this stage, seed moisture content was still high and handling would be more difficult. Drying of seed would require a longer time and become more costly. Delaying harvest beyond 120 days would be of no advantage as it would increase exposure to unfavourable field conditions, produce less yield and increase field germination.

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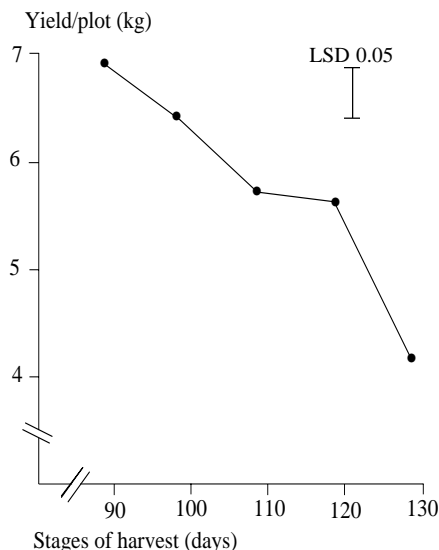


Figure 1. Pod yield of groundnut variety MKT1 from trial at MARDI Gajah Mati

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