



UNIVERSITI PUTRA MALAYSIA

**EFFECT OF HARVEST TIME ON SEED COMPOSITION,
KEEPING QUALITY AND GERMINATION OF GROUNDNUT
(ARACHIS HYPOGAEA L.) VAR. MATJAM**

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EFFECT OF HARVEST TIME ON SEED COMPOSITION,
KEEPING QUALITY AND GERMINATION OF GROUNDNUT
(Arachis hypogaea L.) var. MATJAM

by

Teng M. Abdul

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DEDICATED

to the memory of my late mother
(who passed away when I was
at a tender age of one
year and six months),
and to my late
grandparents

and

to my wife, Pute, whose help in the
completion of my doctoral studies
was as vital as my effort and
to my son, Mohammad Shaharil,
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inspiration and love



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An abstract of the thesis presented to the Senate of Universiti
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July 1992

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Faculty : Agriculture

Differences in seed maturity during harvest have been a common problem in groundnut. The present study was conducted to look into different factors in order to obtain viable information that could define optimum harvest for Matjam groundnut. These characters include: (a) percentage of mature pods per 100 pods, (b) weight of kernels per plant, (c) oil, protein, and carbohydrate contents, (d) keeping quality, and (e) germination rate.

The groundnut was grown in the field in 1986 and 1987 and harvested at 17 different harvest dates from 68 days after planting (DAP) to 100 DAP.



The percentage of mature pods per 100 pods in both years was about 65.6% at 88 DAP. Later harvests did not show significant increase in percentage of mature pods. Highest kernel weight of 8.18 g/plant was obtained at 100 DAP but was not significantly different from the 92 and 96 DAP with 7.78 and 6.55 g/plant, respectively. The number of nodes on the main axis between 88-96 DAP ranged from 26 to 28. This plant character was easy to identify and to count because even when the leaves had fallen, the scars could still be seen.

Highest crude oil and storage protein contents were obtained from seeds harvested at 80 DAP onwards. Available carbohydrate was highest from seeds harvested before 82 DAP. More stable nutrient components was noted from the 92 and 100 DAP seeds while highest germination rate was between 90-98 DAP.

Under the conditions of the study, it was appropriate to harvest between 88-96 DAP. Among plant characters, the number of nodes on the main axis appeared promising as guide for optimum harvest. The nutrient components, on the other hand, were impractical to use as an index for optimum harvest. Seed dry matter, however, seems to be a good index in determining physiological maturity while moisture content looks like an excellent predictor of optimum time to harvest the pods.



Abstrak tesis yang dikemukakan kepada Senat Universiti
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syarat untuk ijazah Doktor Falsafah

KESAN MASA MENUAI KE ATAS KOMPOSISI BIJI, KUALITI
SIMPANAN DAN PERCAMBAHAN KACANG TANAH
(Arachis hypogaea L.) var. MATJAM

oleh

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Perbezaan dalam kematangan biji benih adalah merupakan masalah yang biasa dijumpai pada kacang tanah. Penyelidikan ini dijalankan untuk mengkaji faktor-faktor yang berlainan, dengan tujuan mendapatkan maklumat yang sesuai untuk memastikan masa pemungutan hasil yang optima bagi kacang tanah jenis Matjam. Ciri-ciri ini mencakup: (a) peratus buah masak dalam setiap 100 buah, (b) berat isirong pada setiap tanaman, (c) kandungan minyak, protein dan karbohidrat, (d) kualiti penyimpanan, dan (e) kadar percambahan.



Kacang tanah yang dikaji telah ditanam di ladang dalam tahun 1986 dan 1987 dan telah dituai pada 17 tarikh tuaian yang berlainan dari 68 hari selepas penanaman (HSP), hingga 100 HSP.

Peratus lenggai matang dalam setiap 100 lenggai pada ke dua-dua tahun adalah dalam anggaran 65.5% pada 88 (HSP). Tuaian selepas jangkamasa ini tidak menunjukkan tambahan yang bererti dalam peratus lenggai matang. Berat isirong paling tinggi 8.18 g/pokok telah diperolehi pada 100 HSP, tetapi tidaklah begitu ketara bezanya daripada 92 dan 96 HSP dengan masing-masingnya 7.78 dan 6.55 g/pokok. Bilangan ruas pada paksi utama di antara 88-96 HSP adalah dalam julat 26-28. Sifat pokok yang ini adalah mudah dikenalpasti dan dikira kerana walaupun setelah daun-daun gugur, parutnya masih boleh dilihat.

Kandungan terbanyak minyak mentah dan protein tersimpan telah diperolehi daripada biji-biji yang dituai pada 80 HSP ke atas. Karbohidrat tersedia didapati paling tinggi dalam biji-biji yang dituai sebelum 82 HSP. Komponen nutrien yang lebih stabil dikesani dalam hasil tuaian di antara 92 dan 100 HSP, manakala kadar percambahan paling tinggi diperolehi bagi hasil tuaian di antara 90-98 HSP.

Di bawah keadaan kajian, tuaian adalah paling sesuai dilakukan di antara 88-96 HSP. Di antara sifat-sifat tumbuhan, bilangan ruas pada paksi utama kelihatan sangat meyakinkan



sebagai panduan untuk tuaian terbaik. Sebaliknya, komponen nutrien tidak sesuai digunakan sebagai petunjuk bagi tuaian terbaik. Walau bagaimanapun, bahan kering biji kelihatan sebagai petunjuk yang baik dalam menentukan kematangan fisiologi manakala kandungan lembapan didapati sebagai peramal (penunjuk-indicator) yang sangat baik bagi waktu terbaik untuk menuai lenggai.



CHAPTER 1

INTRODUCTION

In Malaysia, substantial quantities of foods and feedstuffs for local consumption are being imported into the country. This importation of foods and feedstuffs is the result of insufficient production of food crops to meet the national requirement. Success in plantation crops such as rubber and oil palm has already been attained but they are mainly for exports. The country's population is rapidly increasing, thus, the demand for high protein foods, vegetable oils, and feedstuffs are expected to increase. Local agricultural production should be increased in order to curb dependence on food from other countries.

In terms of oil and protein-rich foods, groundnut is the best source and besides, it has been known to farmers. Revitalisation of locally grown groundnuts aside from providing income to the farmers, reduces government expenses on importation of its products and possibly a lower market price for the local consumers. In addition, establishment of groundnut plantations could ensure constant supply of good quality seeds for the local processors.

Malaysia is suitable for groundnut growing because of its equatorial-type climate with humidity above 60%, abundant



rainfall (200–300 cm/yr), and temperatures ranging between 22–31 °C (Halim and Ramli, 1980). Despite its suitability, however, the total land area devoted to sole groundnut cultivations in 1976 was only 5794 hectares (Wong et al., 1979). This hectarage under cultivation was small compared to other crops. The area further decreased by about 82.7% in the early part of 1988. This decrease was attributed to competition with other crops like tobacco (Ramli, MARDI, 1990, pers. comm.) and the high manual labour required (e.g., sowing and uprooting).

The uneven maturation of pods poses a big problem among farmers. During harvest, they often find considerable portion of the bunch having pods that are still developing or still immature which gives them an impression of poor harvest. For them, the time to harvest the pod is one of the most important and difficult decisions they have to make. The wide variation in maturity among pods makes it difficult for them to determine the optimum stage of maturity at which the crop should be harvested. As farmers are fearful of seed losses due to early or late harvesting they tend to harvest the nuts at their own choice without considering the percentage of matured pods and the extent of seed composition which affect quality. More often, the more slowly-developing seeds in the pods still have not reached physiological maturity at the time the first pod matures. The crop must be harvested at the optimum time in