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Effect of variety and plant
population on the yield of

RESEARCH CORPORATION OF THAILAND

in collaboration with

KHON KAEN SEED MULTIPLICATION STATION
NON SUNG AGRICULTURAL EXPERIMENT STATION

RESEARCH PROGRAMME NO. 44
PRODUCTION AND UTILIZATION OF GRAIN LEGUMES

RESEARCH PROJECT NO. 44/2
IMPROVEMENT OF CULTURAL PRACTICES OF GRAIN LEGUMES

REPORT NO. 1
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EFFECT OF VARIETY AND PLANT POPULATION ON THE YIELD OF PEANUT

By Songkiat Visutti pitakul* and Prapandh Boonklinkajorn*

SUMMARY

Three peanut varieties (Argentine, P.I. 161312, and Texas 206) were planted at the density of 26,800, 18,000 and 13,400 plants/rai (20 x 30 cm, 30 x 30 cm, and 30 x 40 cm spacing) at Khon Kaen Seed Multiplication Station and Non Sung Agricultural Experiment Station. Results of the study indicated that Argentine gave higher seed yield than P.I. 161312 and Texas 206 at Khon Kaen SMS, but it produced lower yield than the latter two at Non Sung AES. Texas 206 gave higher plant yield than P.I. 161312 and Argentine at both locations.

Closer spacing or greater plant population gave higher seed yield and plant yield than wider spacing or smaller plant population at both locations. However, it was also found that shelling percentage was not statistically influenced by variety and plant population under study.

INTRODUCTION

Peanut (Arachis hypogea L.) is one of Thailand's economic food crops. Acreage and production statistics as reported by the Division of Agricultural Economics (1968) are given in Table 1. It is clearly shown by Table 1 that production of peanut has increased only slightly, while the area planted has greatly increased, indicating an off-balance. This is due to the decrease in peanut yield per unit area, i.e. from 221 to 202 kg/rai. Such a decrease directly affects the farmer's returns.

* Crops Research Group, Agricultural Products Research Institute, ASRCT.

TABLE 1. ACREAGE AND PRODUCTION OF PEANUT

Year	Area planted (rai)	Production (tonnes)	Yield (kg/rai)
2506 (1963)	520,000	112,900	221
2507 (1964)	546,000	119,800	222
2508 (1965)	621,000	130,600	219
2509 (1966)	982,000	219,900	230
2510 (1967)	673,000	132,100	202

Yield of peanut can be increased by various possible means, e.g. by using improved variety and suitable plant population. In 1962, a Spanish variety was found to produce higher yield at Roi Et (Research and Experiment Station Division 1963). A group of introduced varieties were studied during 1970-1971 at Non Sung Agricultural Experiment Station, Khon Kaen Seed Multiplication Station, and North-East Agricultural Center. The results indicated that Texas 206, P.I. 161312, and Argentine gave significantly higher yield than the standard (Rayong) variety (Visuttipitakul 1972).

Regardless of genetic make-up, proper cultural practices play an important role in the improvement of production. Proper plant density is usually required by a given variety of crop, in a given location. Spacing of 20 x 30 cm at Roi Et Agricultural Experiment Station produced greater yield of peanut than those with spacings of 10 x 30 cm, 30 x 30 cm, 30 x 45 cm, and 30 x 60 cm (Research and Experimental Station Division 1961).

The present study was aimed at the determination of proper plant populations for Texas 206, P.I. 161312, and Argentine varieties previously found to produce higher yields than the Rayong standard variety (Visuttipitakul 1972). The study was carried out at Khon Kaen Seed Multiplication Station and Non Sung Agricultural Experiment Station in 1971.

MATERIALS AND METHODS

Three peanut varieties, i.e. Argentine, P.I. 161312, Texas 206, were used in the study.

Plant populations were set out as follows:

- 26,800 plants/rai (20 x 30 cm spacing)
- 18,000 plants/rai (30 x 30 cm spacing)
- 13,400 plants/rai (30 x 40 cm spacing)
- 134,500 plants/rai (30 x 40 cm spacing)

Ammonium sulphate, 15 kg/rai; double superphosphate, 33 kg/rai; and muriate of potash, 20 kg/rai, were applied.

The study comprised two separate experiments : Experiment I, a split plot design with three replicates; Experiment II, a split plot design with four replicates. In both experiments, the main plot was assigned to variety, and the sub-plot, to plant population.

Experiment I was undertaken on 24 July 1971 at Khon Kaen Seed Multiplication Station, and Experiment II on 28 November 1971 at Non Sung Agricultural Experiment Station.

Prior to planting, fertilizer was broadcast onto the plot. Two seeds were planted to a hill. An insecticide named Diazinon 20% was sprayed onto the plots to prevent destruction of seeds by ants. The seedlings were thinned to one plant per hill 15 days after planting.

Along the course of study, leaf roller, aphid, leaf hopper, and caterpillar were found attacking the peanut plants at Khon Kaen SMS (Experiment I).

Caterpillars were found attacking the peanut plants from seedling stage. Sevin 85 insecticide was applied since then up to $2\frac{1}{2}$ months old at approximately two-week intervals. A few evidences of stalk rot were observed at seedling stage; however, after the plants were $2\frac{1}{2}$ months old, it was experienced that Cercospora leaf spot disease, which was very common to the area, would be widely attacking the plots. As a control measure, Benlate fungicide was applied at two-week intervals.

At Non Sung AES (Experiment II), only leaf roller and caterpillars were found causing slight damages. Sevin 85 insecticide was used.

Cercospora leaf spot was observed, and Benlate fungicide was applied 3 times at two-week intervals.

Argentine and P.I. 161312 were harvested at the age of 110 days, while Texas 206 was harvested at the age of 120 days. Border rows were excluded from the harvest. The pods were taken out from the plants after the harvest; they were separately sun-dried for about 7 days. Measurements of pod yield, seed yield, and plant yield were made, and shelling percentage was calculated.

RESULTS

i) Pod yield

Tables 2 and 3 show pod yields of Experiments I and II respectively. Significant differences are seen among varieties and plant populations in both experiments.

In Experiment I (Table 2), Argentine gave the highest pod yield with a mean of 342.9 kg/rai, while Texas 206 and P.I. 161312 gave 301.4 and 272.2 kg/rai respectively. However, in Experiment II (Table 3) Argentine produced significantly lower pod yield than Texas 206 and P.I. 161312.

Both experiments also demonstrated in Tables 2 and 3 that greater plant populations produced greater pod yields at Khon Kaen SMS and Non Sung ABS.

TABLE 2. POD YIELD OF EXPERIMENT I

Variety	Pod yield at indicated plant population			Mean (kg/rai)
	26,800 p1/rai (kg/rai)	18,000 p1/rai (kg/rai)	13,400 p1/rai (kg/rai)	
Argentine	412.44	363.90	271.39	349.22
P.I. 161312	305.77	274.95	235.84	272.17
Texas 206	334.22	283.27	286.82	301.40
Mean	350.79	307.34	264.67	
L.S.D. (variety)	5% 38.19		L.S.D. (population)	5% 41.07
	1% 63.36			1% 57.56

TABLE 5. SEED YIELD OF EXPERIMENT II

Variety	Seed yield at indicated plant population			Mean (kg/rai)
	26,800 pl/rai (kg/rai)	18,000 pl/rai (kg/rai)	13,400 pl/rai (kg/rai)	
Argentine	291.02	199.89	178.31	223.07
P.I. 161312	284.33	231.53	216.60	244.48
Texas 206	281.84	221.51	225.49	242.95
Mean	285.72	217.95	206.79	

L.S.D. (population) 5% 16.43
1% 22.51

iii) Shelling percentage

Shelling percentages of Experiment I are given in Table 6 and those of Experiment II in Table 7.

TABLE 6. SHELLING PERCENTAGE OF EXPERIMENT I

Variety	Shelling percentage at indicated plant population			Mean (%)
	26,800 pl/rai (%)	18,000 pl/rai (%)	13,400 pl/rai (%)	
Argentine	73.00	74.33	74.17	73.83
P.I. 161312	71.37	73.83	72.33	72.51
Texas 206	74.00	70.50	73.50	72.66
Mean	72.79	72.89	73.33	

TABLE 7. SHELLING PERCENTAGE OF EXPERIMENT II

Variety	Shelling percentage at indicated plant population			Mean (%)
	26,800 pl/rai (%)	18,000 pl/rai (%)	13,400 pl/rai (%)	
Argentine	67.87	64.00	65.65	65.84
P.I. 161312	65.50	66.00	64.87	65.46
Texas 206	64.75	63.25	64.28	64.13
Mean	65.04	64.42	64.97	

These two experiments indicated that shelling percentage was not influenced by plant population and that all varieties had statistically the same percentage.

(iv) Plant yield

Yields of sun-dried plants of Experiment I are given in Table 8 and those of Experiment II in Table 9. Significant differences occurred among varieties and plant spacings at both locations.

TABLE 8. PLANT YIELD OF EXPERIMENT I

Variety	Plant yield at indicated plant population			Mean (kg/rai)
	26,800 pl/rai (kg/rai)	18,000 pl/rai (kg/rai)	13,400 pl/rai (kg/rai)	
Argentine	340.15	246.50	224.00	270.22
P.I. 161312	292.72	254.79	237.04	261.51
Texas 206	386.38	301.04	334.22	340.51
Mean	339.73	267.44	265.06	
L.S.D. (variety)	5% 49.85		L.S.D. (population)	5% 31.75
	1% 82.66			1% 44.55

TABLE 9. PLANT YIELD OF EXPERIMENT II

Variety	Plant yield at indicated plant population			Mean (kg/rai)
	26,800 pl/rai (kg/rai)	18,000 pl/rai (kg/rai)	13,400 pl/rai (kg/rai)	
Argentine	548.44	391.10	295.11	411.55
P.I. 161312	569.77	373.33	360.00	434.34
Texas 206	775.10	671.99	489.77	645.61
Mean	631.10	478.78	381.61	
L.S.D. (variety)	5% 54.19		L.S.D. (population)	5% 44.91
	1% 82.10			1% 61.51

Texas 206 gave the highest plant yield in both experiments, with averages of 340.51 and 645.61 kg/rai at Khon Kaen SMS and Non Sung AES, respectively. Plant yields of P.I. 161312 and Argentine were not significantly different.

So far as plant population is concerned, closer spacings (greater populations) produced more plant yields as in the cases of seed and pod yields.

DISCUSSION

It is interesting to note that the yields of Argentine at Khon Kaen SMS and Non Sung AES were 258 and 223 kg/rai, respectively, and that the yield of 258 kg/rai was top-ranked at Khon Kaen SMS, while the yield of 223 kg/rai was the lowest at Non Sung AES. However, its yield at Non Sung AES was not significantly lower than those of P.I. 161312 and Texas 206. Visuttipitakul (1972), who conducted a series of variety trials, found results that agreed well with this finding. A possible conclusion is that Argentine is better adapted to the sandy soil of Khon Kaen SMS than to the clay loam soil of Non Sung AES.

Taking the effect of plant spacing into consideration, it is also interesting to point out that all data gathered, except the shelling percentage, show that closer spacings (greater plant populations) produce greater yields. It is clearly indicated that much closer spacing may give higher yields than those of the 20 x 30 cm spacing. Further investigation, especially on closer plant spacing, is strongly recommended.

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REFERENCES

- RESEARCH AND EXPERIMENT STATIONS DIVISION, DEPARTMENT OF AGRICULTURE.
(1961).—"รายงานประจำปี ๒๕๐๔." [1961 Annual Report.]
(Bangkok.)
- RESEARCH AND EXPERIMENT STATIONS DIVISION, DEPARTMENT OF AGRICULTURE.
(1963).—"รายงานประจำปี ๒๕๐๖." [1963 Annual Report.]
(Bangkok.)
- DIVISION OF AGRICULTURE ECONOMICS, MINISTRY OF AGRICULTURE (1968).—
"Agricultural Statistics of Thailand." (Bangkok.)
- VISUTTIPITAKUL, S. (1972).—การคัดเลือกและเปรียบเทียบพันธุ์ถั่วลิสง
(Selection and variety trial on peanut). M.S. Thesis, Kasetsart
University (Bangkok).