การศึกษาเรื่องการผลิตเมล็ดพันธุ์ผัก พ.ศ. ๒๕๐๖ – ๒๕๐๘

Studies on Vegetable Seed Production, 1963–1965 [1]

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Most of the seeds used in growing vegetables in Thailand are being imported from Hongkong, Formosa, Japan and other countries. If these seeds can be produced profitably in Thailand, the import of seeds can be drastically reduced. Furthermore, it may be possible to provide farmers with seeds of varieties that are especially adapted to the climate of Thailand.

One of the earliest reports on vegetable seed production in Thailand was that by Sasiplin (1955), who showed that Chinese radish can be successfully grown for seeds at Fang in Chiengmai. In 1959, Stienswat with his co-workers initiated a systematic study on vegetable seed production at the Pakchong Experiment Station in Nokorn Rajasima. They observed that such vegetables as radish, kale, Chinese (petsai and pakchoi) cabbage, Chinese convolvulus, lettuce, peas and beans will produce seeds satisfactorily (Stienswat, 1962; Stienswat et al., 1962). Spacing tests on petsai (Potipan, 1961) and pakchoi [Katiya, 1962] were conducted but failed to show significant differences.

The investigation on vegetable seed production was supported by USOM Thailand from 1960 to 1962. Beginning in January, 1963, this investigation was continued under the auspices of the Kasetsart/Hawaii University Contract (KU/UH Project No. 15). The results during the first year of Contract support were summarized and reported by Stienswat et al. (1963). Although several spacings with Chinese radish did not show any statistical differences, the 70 × 30 cm. spacing was recommended because it yielded the best size of seed. The following seed yields in kg. per rai were obtained: lettuce–528, *Brassica pekinensis*–33, *Chrysanthemum coronarium* –106 *Brassica oleracea* var. *acephala*–83, *Ipomoea reptans*–62, and Chinese radish –28. The results of the studies conducted during 1963-65 are summarized and reported herein.

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1. This investigation was conducted under the auspices of the Kasetsart/Hawaii University Contract in cooperation with USOM Thailand (KU/UH Project No. 15.)
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EFFECT OF FERTILIZERS ON SEED YIELD OF TWO LETTUCE VARIETIES

According to Stienswat et al. (1962; 1963), lettuce is promising for seed production at Pakchong. In order to determine whether fertilization would effect seed yield of lettuce, an experiment was conducted at the Pakchong Farm during the growing season in 1963–64.

Materials and Methods

Two varieties, Botavia Blonde de Paris and White Boston, were used in the test. The seeds were sown on November 8, 1963 and transplanted into the field on December 15, 1963. Individual plots consisted of 32 plants in two rows 75 cm. apart, with plants spaced 30 cm. within the row. The treatments were 5–10–5 and 10–10–5 complete fertilizers at the rates of 10, 20 and 30 gm./plant and the control (no fertilizer). The applications were made on January 1, 1964. Seeds were harvested on March 24, 1964, about 138 days from seedage.

Results and Discussion

Table 1. *Effect of fertilizers on seed yield (gm.) of Botavia Blonde de Paris and White Boston lettuce*

Fertilizer treatment	Botavia Blonde de Paris	White Boston
Control	471	229
5–10–5 10 gm./plant	654	286
5–10–5 20 gm./plant	396	264
5–10–5 30 gm./plant	440	315
10–10–5 10 gm./plant	385	383
10–10–5 20 gm./plant	423	396
10–10–5 30 gm./plant	448	293

The results of the test are presented in Table 1. There were no significant differences in yield among the fertilizer treatments. This is probaby due to the fact that plant nutrients were not limiting at the Pakchong Farm. With continued cultivation, however, nutrient deficiencies may become a problem.

The difference in seed yield between the two varieties was significant. Botavia Blonde de Paris gave a higher yield than White Boston and can be recommended for the production of seed at Pakchong.

COMPARISON OF SEED YIELDS OF LETTUCE VARIETIES

Earlier experiments indicated that some lettuce varieties are adapted for seed production at Pakchong. In order to compare the performance of different lettuce varieties, a variety trial was conducted at the Pakchong Farm during the 1964–65 growing season.

Materials and Methods

Ten varieties introduced from the United States were included in the test. The seeds were sown in beds at Bangkhen on November 4, 1964, transplanted into jiffy pots on November 24, 1964 and transplanted into the field at Pakchong on December 15, 1964. The experimental design was randomized complete blocks with 3 replications. Individual plots consisted of 40 plants in two rows 60 cm. apart, and plants spaced 30 cm. within the row. Seeds were harvested between 140 to 152 days after seedage.

Results and Discussion

Table 2. *Plant stand of lettuce varieties at 156 days after germination (40 plants per plot)*

Variety	Replicate			Total
	1	2	3	
Deer Tongue	38	34	40	112
Burpee Wayahead	36	35	28	99
Burpee Greenheart	29	28	28	85
Black Seeded Simpson	10	12	18	40
Grand Rapid	24	32	34	90
Ruby W.S.	33	31	32	96
Imperial No. 44	8	15	2	25
New York No. 515	19	20	24	63
Great Lake	0	1	8	9
Premier Great Lake	4	7	3	14

Most of the lettuce varieties grew well. The crisp-head varieties produced fine heads. However, after heading, many plants were infected with the bacterial soft rot (*Erwinia* sp.) and eventually died. The crisp-head varieties, Imperial No. 44, Great Lake and Premier Great Lake were particularly susceptible to the disease (Table 2). On the other hand practically all of the plants of Deer Tongue, a leaf-type, survived.

Table 3. *Seed yield of lettuce varieties (gm.)*

Variety	Replicate			Total
	1	2	3	
Deer Tongue	86	48	82	216
Burpee Wayahead	85	136	32	253
Burpee Greenheart	31	10	5	46
Black Seeded Simpson	12	9	22	43
Grand Rapid	46	20	24	90
Ruby W.S.	18	19	9	46
Imperial No. 44	3	12	0	15
New York No. 515	11	20	16	47
Great Lake	0	0	0	0
Premier Great Lake	0	0	0	0
L.S.D. 5%				99.5
1%				136.3

In Table 3 are shown the seed yields. Both Deer Tongue and Burpee Wayahead were outstanding. The crisp-head varieties performed poorly, and no seed was obtained for either Great Lake or Premier Great Lake.

It can be seen from the results in Table 3 that there were considerable variations within treatments. The disease infections contributed greatly to this variation, but probably other factors were also involved.

The results of the trial indicate that it would be difficult to obtain satisfactory seed production with the crisp-head type lettuce varieties. On the other hand, the leaf type such as Deer Tongue or Burpee Wayahead can be successfully grown for

seeds. It is important that diseases are kept under control.

TIME OF PLANTING AFFECTING SEED OF CHINESE KALE

The Chinese kale is a popular vegetable, grown the year round in Thailand. Stienswat et al. (1962) reported that it can be successfully grown for seed at Pakchong. Production of seeds, however, can be best obtained during the winter. In order to determine the best time of planting to obtain the best seed yield, the following experiment was conducted.

Materials and Methods

Small Leaf *Kailaan*, an early variety of Chinese kale was used in the test. The treatments involved six seedage dates at weekly intervals beginning November 24, 1964. A week after seedage, the seedlings were transplanted into seed beds and four weeks later transplanted into the field at Pakchong. A randomized complete block design with 4 replications was used. Individual plots consisted of 32 plants in two rows 100 cm. apart with plants spaced 50 cm. within the row.

Calnitro fertilizer (32% CaO, 20% N) at the rate of 30 gm./plant at 7 and 14 days and a complete fertilizer at 21 days after transplanting into the field were applied. Seeds were harvested from April 26 to May 22, 1965.

Results and Discussion

The plants grew well and produced seed stalks. Flowers were abundant and seed pods were formed, but seed production was generally poor. Parthenocarpy was prevalent. Also considerable variation among individual plants were noted.

Table 4. *The effect of time of planting on seed yield (in gm.) of Chinese kale (Small Leaf Kailaan).*

Date of Seedage	Replicate 1	2	3	4	Total
November 24, 1964	44.6	29 3	19.2	11.7	104.8
December 1, 1964	28.3	6.4	16.8	17.4	68.9
December 8, 1964	5.7	13.6	6.3	3.7	29.3
December 14, 1964	1.9	6.2	8.5	12 3	28.9
December 21, 1964	0.0	0.0	1.2	0.0	1.2
December 29, 1964	0.0	0.0	0.0	0.0	0.0
L.S.D. 5%					81.2
1%					112.3

As can be seen in Table 4, the seed yields decreased with a delay in the planting date. The best seed yield was obtained from the earliest seeding date, while the last seeding date failed to produce any seed. It appears that the seedage date should not be later than November 24 and preferably should be earlier to produce best results.

The relatively high temperatures encountered during the period of flowering Probably accounted for the high degree of parthenocarpic seed pods. Also possibly self or cross incompatibilities were operating, for plants growing side by side and flowering at the same time produced varying amounts of seed. A selection program favoring high seed yield should enhance future seed yields.

TIME OF PLANTING AFFECTING SEED YIELD OF CAULIFLOWER

The cauliflower can be grown successfully as a vegetable crop in the Pakchong region. The production of seed, however, appears to be difficult. To determine whether time of planting affects seed yield of cauliflower, the following test was conducted at the Pakchong Farm.

Observation and Discussion

Table 5. *Observations on curd, stalk and seed pod formation in Early Snowball Cauliflower*

Treatment	February 15, 1965	February 27, 1965	March 20, 1965
1	All had produced curds Flower stalks began to develop 2 weeks earlier.	All stalks produced flowers.	Pods formed but parthenocarpic.
2	All had produced curds. Flower stalks began to develop 1 week earlier.	Stalks developed completely, but not in flower.	Pods formed but parthenocarpic.
3	All had produced curds. Flower stalks beginning to develop.	Stalks developing.	Stalks developed and flowered but no pods.
4	Curds developing.	Curds matured.	Stalks developed but no flowers.
5		Some curds developing	Some curds matured. Some without curds.
6		No curd formation.	No curd formation.

Materials and Methods

Early Snowball, a variety that is well adapted to the climate of Thailand, was used in the test. The treatments involved 6 seedage dates beginning November 23, 1964. Five weeks after seedage the seedlings were transplanted into the field at Pakchong. A randomized complete block design with 4 replications was used. Individual plots consisted of 32 plants in 2 rows spaced 100 cm. apart. The plants were spaced 50 cm. within the row.

Some observations on curd, stalk and seed pod formation are presented in Table 5. The first three planting date treatments resulted in satisfactory curd, stalk, and flower production. In the first two treatments, seed pods were formed, but they were parthenocarpic and lacked seed. The two latest planting dates resulted in poor curd formation.

As in the previous experiment with the Chinese kale, the high temperatures during the period of flowering may be responsible for the poor seed set. Perhaps an earlier planting date which will allow flowering during the cool period will favor seed production in the cauliflower.

THE EFFECT OF SPACING ON SEED YIELD OF SWEET CORN

Sweet corn can be cultivated successfully in the Pakchong area. In order to establish the proper spacing for the production of seed, an experiment on several spacings was conducted at the Pakchong Farm during the winter of 1965.

Materials and Methods

A randomized complete block design with 4 replications was used. Individual plots consisted of 3 rows spaced 85 cm. apart. The distance between plants and the number of plants per plot were as follows:

1. 10 × 85 cm., 105 plants
2. 20 × 85 cm., 51 plants
3. 30 × 85 cm., 33 plants
4. 40 × 85 cm., 24 plants
5. 50 × 85 cm., 21 plants
6. 60 × 85 cm., 18 plants

The variety used in this test was Hawaiian Sugar. Seeds were sown on December 29, 1964, and the seedlings were thinned on January 25, 1965 to give the desired spacings; 15–15–15–4 complete fertilizer was applied once on January 27, 1965.

Results and Disscussion

The results are shown in Table 6. With a decrease in spacing there was an increase in the number of plants per plot and a corresponding increase in seed yield. The closest spacing of 10 × 85 cm. gave the highest yield of 24.9 kg. which was approximately 20 percent higher than that of the 20 × 85 cm. spacing. The closest spacing comprised 420 plants that produced 504 ears, while the 20 × 85 cm. spacing consisted of half as many plants (204) with 384 ears. Thus, in terms of yield per plant, the closer the planting the smaller is the yield.

As the spacing increased, the number of ears produced per plant also increased up to a certain point. The wider spacings

Table 6. *Effect of spacing on seed yield of Hawaiian Sugar sweet corn*

Treatment	Total no. of plants	Total no. of ears	Total weight of ears (kg.)	Total weight of seeds (kg.)	Ave. weight of seeds per ear (gm.)
10 × 85 cm.	420	504	27.3	24.9	49.4
20 × 85 cm.	204	384	25.9	19.5	50.7
30 × 85 cm.	132	310	19.7	15.9	51.3
40 × 85 cm.	96	205	16.2	13.0	63 6
50 × 85 cm.	84	208	13.9	11.8	56.5
60 × 85 cm.	72	183	13.5	10.3	56.5
L.S.D. 5%		50.5	4.01	4.56	
1%		70.9	5.54	6.30	

allowed a more vigorous growth. The 50 × 85 cm. and 60 × 85 cm. spacings produced an average of about $2\frac{1}{2}$ ears per plant, while the closest spacing of 10 × 85 cm. produced slightly over one ear per plant. The third ears on a plant, however, were small and carried only a few kernels.

The closest spacing of 10 × 85 cm. can be recommended for seed production. If the seeds for planting are limited, the next wider spacing of 20 × 85 cm. would require half as many seeds, but may reduce the yield by about 20 percent.

SUMMARY

1. Several experiments on vegetable seed production were conducted at the Pakchong Farm in Nakorn Rajasima from 1963 to 1965

2. Fertilizer treatments on two varieties of lettuce failed to produce statistical differences indicating that nutrient availability was not a limiting factor at the Pakchong Farm. Botavia Blonde de Paris outyielded White Boston.

3. Deer Tongue and Burpee Wayahead produced the highest seed yields among 10 lettuce varieties included in the test. The performances of the crisp-head varieties were very poor.

4. Seed yields of Small Leef Kailaan, an early variety of Chinese kale, decreased with a delay in seedage date beginning November 24, 1964. The last seedage date, December 29, 1964, failed to produce any seed. Parthenocarpic seed pod formation was common, due probably to the high temperatures during the flowering period.

5. Early Snowball cauliflower planted at weekly intervals beginning November 23, 1964, failed to produce any seed. The early seedage date treatments produced abundant flowers and some parthenocarpic seed pods. The earlier the planting date, the better was the production.

6. A test involving 6 spacings on Hawaiian Sugar sweet corn showed that the yields decreased with increased spacing. The closest spacing of 10 × 85 cm. yielded about 20 percent more seeds than the next wider spacing of 20 × 85 cm.

สรุป

รายงานเรื่องนี้เป็นผลการทดลองเกี่ยวกับการผลิตเมล็ดพันธุ์ผักหลายเรื่องด้วยกัน เป็นการทดลองที่ทำที่สถานีผักนิสิตปากช่อง นครราชสีมา ตั้งแต่ พ.ศ. 2506 ถึง พ.ศ. 2508

1. ผลการทดลองปุ๋ยกับผักสลัด พันธุ์ Botavia Blonde de Paris และพันธุ์ White Boston ปรากฏว่าปุ๋ยอัตราและสูตรต่าง ๆ ให้ผลไม่แตกต่างกัน

2. ในการทดลองเก็บเมล็ดผักสลัด 10 พันธุ์ Deer Tongue และ Burpee Wayahead ให้เมล็ดพันธุ์สูงสุด

3. ผลของการทดลองเก็บเมล็ดพันธุ์ผักคะน้า ปรากฏว่าคะน้าพันธุ์เบาชื่อ Small Leaf Kailaan ให้เมล็ดน้อยลงตามระยะเวลาของการเก็บเมล็ด เมล็ดลีบมีมาก อาจเป็นเพราะอากาศร้อนระหว่างระยะออกดอก

4. กะหล่ำดอกพันธุ์ Early Snowball ซึ่งปลูกเป็นระยะ ๆ เริ่มตั้งแต่ วันที่ 23 พฤศจิกายน 2507 ไม่ให้เมล็ดเลย

5. ในการทดลองเก็บเมล็ดพันธุ์ข้าวโพดหวาน ปรากฏว่าผลผลิตของเมล็ดพันธุ์จะน้อยลงเมื่อเพิ่มระยะปลูกให้ห่างขึ้น ระยะปลูกที่น้อยที่สุดของการทดลองคือ 10×85 ซม. ให้เมล็ดมากกว่าระยะปลูกที่ห่างกว่านี้อันถัดไป (20×85 ซม.) ถึง 20 เปอร์เซนต์

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