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# EFFECT OF SOWING DATA AS WELL AS NITROGEN FERTILIZER LEVEL ON GROWTH, YIELD AND DRY SEED QUALITY OF COWPEA PLANT.

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## ABSTRACT

A field experiment was carried out at Parramoon Experimental farm (El-Dakahlia Govenorate) during 1998 and 1999 seasons to evaluate the productivity of cow pea (cream 7 c.v.) at three sowing dates started on 10 May with 20 days intervals and three levels of ammonium sulphate 20.6% i.e. 0, 50 and 100 Kg/feddan.

Sowing at 30 May led to increases in all plant growth parameters, of green and seed yield and its components i.e. seed index (weight of 1000 seed) and number of pods per plant as well as seed testing i.e. germination percentage germination rate and germination rate index seedling performance in addition to i.e. hepocotyl and seedling length. On the other hand last sowing date 20 June was very effective on number of seeds per pods and per plant

However, all growth parameters of green and seed yield and its components and quality were significantly increased in this respect.

It could be concluded cowpea (*Vigna unguiculata* L.) grown on last May 30 and applied with 100 Kg ammonium sulphate/feddan gave better green, seed yield and quality.

## INTRODUCTION

Cowpea is an important legume in Africa and other developing countries where they serve as good source of protein, energy and other nutrients. Sowing dates and nitrogen fertilizer levels were found to be important factors, where affect vegetative growth of plants and seed production and quality.

Cowpea growth and production are greatly influenced by environmental condition, specially temperature and humidity. White and Mansfield (1978) reported that intensity; light quality and temperature had different and specific effects on main stem and lateral for growth in phaseouls vulgaris. On the other hand, production was affected by sowing date (Abllon *et al.*, 1977). They found that seed yields of bean were significantly related to energy factors in the climate. Saharia (1981) pointed that pods/plant were reduced by delaying the sowing date (to 15 Sept.). They stated that delayed sowing decreased grains of cowpea.

Regarding the pod characteristics, Shokes *et al.* (1983), reported that seed quality was affected by planting dates. Hall and Patel (1989) reported that high temperature during seed development can cause browning and wrinkling of seed coats. Chalterjee and Son (1990) and Anisa *et al.* (1995), found that seed sowing in Oct. to Dec. showed a pronounced effect on seed yield, its components and seed quality of climbing French bean (*Phaselus vulgaris* L.) Samira and Faris, 1995 pointed out that cowpea plant height and leaf area index were significantly increased at the 3$^{rd}$, 4$^{th}$ and 5$^{th}$ planting date

respectively than the early planting dates. The highest dry weight of cowpea production as well as pod characteristics i.e., weight, length and number of seed per pod were also enhanced by the same dates. As for N fertilizer Abo-Shetaia (1990) indicated that 75 Kg/fed. gave taller plants and higher pod length, whereas 60 Kg N and 46.5 Kg P/fed. gave the highest values of yield components and seed yield of faba bean.

Many investigations Leidi and Gomez (1980); Wistinghausen and Richter (1983); Anez and Tavira (1985), Hera *et al.* (1985) and El-Gizy (1990) pointed out that seed yield of phaseolus vulgaris significantly increased with increasing rate of N, they also added that increasing N rates generally increased the number and weight of pods/plant and seeds yield/ha.

This work was undertaken to determine the optimum sowing data for cowpea plants as well as the optimum N rates which can produce the maximum green pods and dry seeds yield with good quality under Parramoon Experimental Farm (El-Dakahlia Govenorate).

## MATERIALS AND METHODS

Field experiment was carried out at El-Parramoon Experimental farm during summer seasons (1998 and 1999). It aimed to study the best sowing date for cowpea plants (*Vigna unguiculata* L.). Seeds of cream 7. c.v. were sown at three planting dates with approximately 20 days intervals, i.e. 11 May, 31 May and 20 June. Three levels of ammonium sulphate/feddan i.e. 0, 50 and 100 Kg N/fed. were also taked. All plants were fertilized with calcium superphosphate at 200 Kg ($P_2O_5$ 15.5%) and potassium sulphate at 100 Kg/fed. (48% $K_2O$). These amounts were mixed were tested of ammonium sulphate and divided into three equal prates. The first part was applied 3 weeks after sowing, the second and the third one was applied 3 replicates. These treatments were arranged in split – plots design. The sowing data were arranged in main plots and nitrogen fertilizer were plotted at random in subplots. The area of sub-plot was 10.4 $m^2$ with four rows i.e. two (5.2 $m^2$) for green yield and another two rows (5.2 $m^2$) for seed each was of 4.0 m in length and 0.65 m width.

Chemical analysis of the experimental soil was determined by methods of Jackson (1967) and shown in Table (1)

**Table (1): Mechanical and chemical analysis of the experiment soil.**

| Soil properties | 1998 | 1999 | Soil properties | 1998 | 1999 |
|---|---|---|---|---|---|
| Coarse sand % | 1.43 | 1.58 | Total nitrogen % | 0.19 | 0.17 |
| Fine sand % | 18.51 | 18.69 | Available | | |
| Silt % | 35.72 | 35.55 | Phosphorus (ppm) | 1.90 | 2.10 |
| Clay % | 36.30 | 36.92 | Available | | |
| Texture | | | Potassium (ppm) | 20.40 | 18.00 |
| Organic matter % | 1.89 | 1.87 | PH | 7.70 | 7.92 |

Representative samples of 4 plants were taken randomly from each gplot at 84 days after sowing to study the following items:-

1- Plant growth expressed as: plant height (cm.), branches, leaves number per plant and dry weight for leaves and stems per plant.
2- Number of green pods, pods weight per plant, total of green pod yield per plot (Kg) and per feddan (tons).
3- Dry seed yield and its components i.e. seed yield per plant (g), seed yield per plot (Kg), and seed yield per feddan (Kg), number of pods per plant, number of seeds per plant, weight of seeds per plant, number of seeds per pod and seed weight (g) per pod.
4- Seed quality parameter i.e. seed index (weight of 1000 seed g) germination percentage, germination rate (days).

Germination rate: was determined according to the equation reported by Cleland, 1957 as follows:

$$GR = \frac{d_1n_1 + d_2n_2 + \ldots\ldots\ldots + d_xn_x}{\text{Germination percentage}}$$

Where: $n_1$, $n_2$, $n_3$ and $n_x$ = number of seed germinated in the first, second, third and x countings

$d_1$, $d_2$, $d_3$ and $d_x$ = number of days after planting up to the first, second, third and x countings.

Emergency rate index (ERI) was determined according to the equation reported by Bartlet (1937) as follows:

$$ERI = \frac{n_1 + (n_1 + n_2) + (n_1 + n_2 + n_3) + \ldots\ldots + n_x}{C + [n_1 + n_2 + n_3) + \ldots\ldots + n_x]}$$

Where: $n_1$, $n_2$, $n_3$ ..... $n_x$ = number of germinated seeds at first, second, third and x countings.

C = number of counts.

Germination test experiment was applied on mature extracted seeds from pods 100 seeds which taken at random to test seed viability. The germination test of seed was recorded for 15 days in the incubator with optimum temperature of 25°C.

At 15 days after germination the following measures were taken:

1- The length of each of hepocotyle (cm.).
2- The length of each of misocotyle (cm.)
3- Seedling length (cm.).

All data were subjected to the statistical analysis of variance using the method described by snedecor and Cochran (1967).

## RESULTS AND DISCUSSION

**Plant growth:**

Data recorded at Table (2) show that mide sowing date, i.e. 31 May led to highly significant increases in plant height, number of leaves, dry weight and dry matter per plant but significant increases in branches number were observed in first seasons only. This could be mainly due to suitable temperatures during the last weeks of May. In addition, White and Mansfield (1978) reported that light quality, intensity and temperature had effects on plant growth. This reduction in plant growth characters might be attributed to the low temperature prevailing during the early sowing dates.

**Table (2): Effect of planting dates and nitrogen levels on growth of cowpea plant at two seasons (1998 – 1999).**

| Treatments | | Plant height cm. | | N. of branches pp. | | N. of leaves per plant | | Dry, W. (g) per plant | | Dry matter per plant | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Planting dates | N. L. Kg/N fed. | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| 11 May | 0 | 53.9 | 53.7 | 3.7 | 4.0 | 71.7 | 72.3 | 23.22 | 25.20 | 15.16 | 16.03 |
| | 50 | 65.2 | 67.8 | 5.0 | 5.7 | 88.0 | 90.0 | 35.66 | 36.00 | 19.75 | 17.13 |
| | 100 | 66.6 | 72.0 | 5.7 | 6.0 | 90.3 | 95.3 | 37.80 | 44.73 | 20.85 | 20.09 |
| **Mean** | | **61.7** | **64.5** | **4.8** | **5.3** | **83.3** | **85.9** | **32.23** | **35.31** | **18.59** | **17.75** |
| 31 May | 0 | 57.4 | 55.6 | 4.3 | 4.3 | 72.0 | 75.0 | 24.70 | 25.67 | 15.89 | 16.01 |
| | 50 | 66.7 | 77.5 | 5.7 | 6.3 | 95.0 | 96.0 | 43.31 | 51.00 | 22.07 | 22.24 |
| | 100 | 68.5 | 83.6 | 6.3 | 6.7 | 100.0 | 101.7 | 51.27 | 61.03 | 24.44 | 24.73 |
| **Mean** | | **64.2** | **72.2** | **5.4** | **5.8** | **89.0** | **90.9** | **39.43** | **45.90** | **20.80** | **20.99** |
| 20 June | 0 | 53.6 | 50.2 | 2.3 | 3.7 | 70.7 | 70.7 | 21.97 | 22.93 | 14.66 | 14.78 |
| | 50 | 57.5 | 57.4 | 4.3 | 4.7 | 73.7 | 76.0 | 26.07 | 26.77 | 16.50 | 16.67 |
| | 100 | 63.7 | 66.9 | 4.7 | 5.3 | 79.0 | 81.3 | 31.88 | 33.40 | 18.18 | 18.33 |
| **Mean** | | **58.3** | **58.2** | **3.8** | **4.6** | **74.2** | **76.0** | **26.67** | **27.70** | **16.45** | **16.59** |
| | | **61.5** | **65.0** | **4.7** | **5.2** | **82.1** | **84.3** | **32.78** | **36.30** | **18.61** | **18.45** |
| | 0 | 55.0 | 53.2 | 3.4 | 4.0 | 71.2 | 72.7 | 23.29 | 24.60 | 15.24 | 15.61 |
| | 50 | 63.1 | 67.6 | 5.0 | 5.6 | 85.6 | 87.3 | 34.69 | 37.92 | 19.47 | 18.96 |
| | 100 | 66.2 | 74.1 | 5.6 | 6.0 | 89.9 | 92.8 | 40.32 | 46.39 | 21.36 | 21.36 |
| L.S.D. at 0.05 | | | | | | | | | | | |
| Planting dates | | 2.8 | 3.90 | NS | 0.4 | 4.2 | 1.9 | 1.02 | 0.87 | 0.79 | 0.45 |
| Nitrogen levels | | 3.2 | 3.10 | 0.7 | 1.1 | 2.6 | 2.1 | 0.86 | 0.99 | 0.37 | 0.16 |
| Interaction | | 4.2 | 5.4 | NS | 2.0 | 4.4 | 3.6 | 1.48 | 1.72 | 0.94 | 0.63 |

Also Samira and Faris (1995) reported that plant height and leaf area index of cowpea plant were significantly increased at the 3rd, 4th and 5th planting date respectively than the early planting dates.

Concerning fertilizer levels, the highest rate of nitrogen gave the highest values of all parameters of plant growth i.e. plant height, branches number, leaves, dry weight and dry matter per plant in both seasons. This increase in plant height may be due to the increase in internode length, number of internodes or both, nitrogenous fertilizer had also, a stimulatory effect on branching. Similar conclusion was obtained by Wistinghauson and Richter (1983); Anez and Tavira (1985); Abo-Shetaia (1990). El-Coizy (1990) pointed out that N rate significantly affects morphology of phaseolus, vulgaris.

With respect to the interaction between nitrogen fertilizer levels and sowing date. Significant differences were found in plant height, branches number, dry weight and dry matter in both two seasons except leaves number in first seasons.

Data illustrated in Table (3) presented clearly that the second sowing date (31 May) caused significant increase in yield and its components i.e. pods number, total yield per plant, per plot and per feddan in both seasons.

These results might be attributed to the favorable effect of temperature and light during the period of reproduction processes, i.e., flowering, and growth of pods. In this connection, Shokes *et al.* (1983) revealed that yield was affected by planting dates. Also Saharia (1981) found that pods/plant of vigna were reduced by delayed sowing.

As for nitrogen fertilizers treatments, results indicate that increasing nitrogen rates markedly increased total yield per plant, per plot and per feddan in both seasons. Similar results were obtained by Leidi and Gomez (1980); Hera *et al.* (1985); Abo-Shetaia (1990); El-Gizy (1990) and El-Shamma (1988) on bean. They also added that increasing N rates generally increased the number and weight of pods/plant and gave the highest values of yield.

In addition, it could be noticed that interaction between the highest used rate of nitrogen (100 Kg N/fed.) and second sowing date (31 May) caused significantly increase in green pods yield and weight of total yield compared with other treatments in both seasons.

**Seed quality:**

Data showing the weight of 1000 seeds, number of seed pod, seed per plant and number of pods per plant are presented in Table (4). It is evident from such data that seeds weight was heavier and number of pods per plant were move due to sowing on 31 May sowing date in both seasons. But number of pods per plant and number of seed per pod had no significant effect in the first season. These results might be attributed to the favorable effect of temperature and light during the period of reproduction processes, i.e., flowering, and growth of pods and seeds. The results also agree with those of Saharia (1981) who found that pods/plant of vigna were reduced by delayed sowing. In addition laterest sowing dates (during May) gave highest shelling percentage due to the suitable temperature during maturity of cowpea pods. Shokes *et al.* (1983), reported that seed quality was affected by planting dates. Hall and Patel (1989) pointed out that high temperature during

**Table (3): Effect of planting dates and nitrogen levels on yield of cowpea plant at two seasons (1998 – 1999).**

| Treatments | | N. of pods per plant | | Yield per plant gm. | | Yield per plot Kg. | | Yield per fed. tons | |
|---|---|---|---|---|---|---|---|---|---|
| Planting dates | N. L. Kg/N fed. | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| 11 May | 0 | 6.0 | 7.0 | 66.67 | 69.03 | 3.47 | 3.65 | 1.65 | 1.73 |
| | 50 | 10.0 | 10.0 | 86.93 | 91.93 | 5.77 | 6.15 | 2.74 | 2.92 |
| | 100 | 10.0 | 10.3 | 91.64 | 93.97 | 6.23 | 6.57 | 2.96 | 3.12 |
| Mean | | 8.7 | 9.1 | 81.75 | 84.98 | 5.16 | 5.44 | 2.45 | 2.59 |
| 31 May | 0 | 6.7 | 7.0 | 72.80 | 74.20 | 3.93 | 5.08 | 1.87 | 1.94 |
| | 50 | 10.3 | 11.3 | 93.59 | 95.67 | 6.83 | 6.82 | 3.25 | 3.24 |
| | 100 | 12.3 | 13.7 | 96.21 | 98.37 | 7.50 | 7.87 | 3.56 | 3.74 |
| Mean | | 9.8 | 10.7 | 87.53 | 89.38 | 6.09 | 6.59 | 3.89 | 2.97 |
| 20 June | 0 | 5.0 | 6.3 | 61.45 | 65.23 | 3.07 | 3.32 | 1.46 | 1.58 |
| | 50 | 7.0 | 7.0 | 76.89 | 78.30 | 4.23 | 4.15 | 2.01 | 2.11 |
| | 100 | 8.7 | 9.0 | 81.32 | 82.67 | 4.88 | 5.22 | 2.32 | 2.48 |
| Mean | | 6.9 | 7.3 | 73.22 | 75.40 | 4.06 | 4.33 | 1.93 | 2.06 |
| Mean values of sowing dates | | 8.5 | 9.0 | 77.99 | 83.25 | 5.10 | 5.45 | 2.42 | 2.54 |
| Mean values of N Kg/fed. | | | | | | | | | |
| | 0 | 5.9 | 6.8 | 66.97 | 69.49 | 3.49 | 4.02 | 1.66 | 1.75 |
| | 50 | 9.1 | 9.4 | 85.80 | 88.03 | 5.61 | 5.81 | 2.66 | 2.76 |
| | 100 | 10.3 | 11.0 | 89.72 | 91.73 | 6.20 | 6.55 | 2.95 | 3.11 |
| L.S.D. at 0.05 | | | | | | | | | |
| Planting dates | | 1.00 | 0.6 | 5.11 | 5.23 | 0.33 | 0.37 | 0.16 | 0.12 |
| Nitrogen levels | | 1.00 | 0.9 | 3.55 | 4.13 | 0.23 | 0.59 | 0.11 | 0.14 |
| Interaction | | 2.20 | 1.6 | 6.10 | 6.51 | 0.40 | 0.65 | 0.19 | 0.24 |

Table (4): Effect of planting dates and nitrogen levels on seed yield components of cowpea plant at two seasons (1998 – 1999).

| Treatments | | N. of seed per pod | | N. of pods per plant | | N. of seed per plant | | Seed index W. of 1000 seed | |
|---|---|---|---|---|---|---|---|---|---|
| Planting dates | N. L. Kg/N fed. | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| 11 May | 0 | 14.9 | 11.8 | 8.0 | 9.0 | 144.0 | 141.0 | 113.0 | 120.0 |
| | 50 | 7.7 | 6.2 | 11.0 | 12.0 | 128.0 | 122.0 | 132.0 | 134.0 |
| | 100 | 6.5 | 5.1 | 12.0 | 13.0 | 126.0 | 117.0 | 134.0 | 137.7 |
| Mean | | | | 10.5 | 11.5 | 131.6 | 126.8 | 126.5 | 130.4 |
| 31 May | 0 | 13.6 | 11.2 | 8.0 | 9.0 | 139.0 | 135.0 | 116.0 | 129.7 |
| | 50 | 5.7 | 4.6 | 13.0 | 14.0 | 125.0 | 120.0 | 135.0 | 138.0 |
| | 100 | 4.6 | 4.0 | 14.0 | 15.0 | 120.0 | 119.0 | 141.0 | 143.0 |
| Mean | | | | 12.0 | 13.0 | 126.5 | 132.2 | 132.8 | 137.9 |
| 20 June | 0 | 16.4 | 13.4 | 7.0 | 8.0 | 141.0 | 138.0 | 100.0 | 116.0 |
| | 50 | 11.4 | 14.4 | 9.0 | 10.0 | 137.7 | 133.0 | 118.0 | 125.0 |
| | 100 | 9.4 | 7.9 | 10.0 | 11.0 | 133.0 | 129.0 | 128.7 | 125.7 |
| Mean | | | | 8.8 | 9.8 | 136.4 | 132.5 | 117.2 | 123.2 |
| Mean values of sowing dates | | | | 10.2 | 11.2 | 132.6 | 128.2 | 124.2 | 129.9 |
| Mean values of N Kg/fed. | | | | | | | | | |
| | 0 | 15.0 | 12.1 | 7.7 | 8.7 | 141.3 | 138.0 | 109.7 | 121.9 |
| | 50 | 8.2 | 6.7 | 11.0 | 12.0 | 130.2 | 125.0 | 128.3 | 132.3 |
| | 100 | 6.9 | 5.7 | 12.0 | 13.0 | 126.3 | 121.7 | 134.6 | 135.4 |
| L.S.D. at 0.05 | | | | | | | | | |
| Planting dates | | NS | 0.7 | 1.87 | 0.52 | 3.2 | 4.8 | 2.0 | 4.2 |
| Nitrogen levels | | 2.0 | 1.5 | 0.87 | 1.25 | 3.8 | 3.2 | 1.8 | 3.2 |
| Interaction | | NS | 1.8 | 1.95 | 2.13 | 4.2 | 5.5 | 3.2 | 5.3 |

seed development can course browning and wrinkling of seed coats on dry yield of cowpea plants. Samira and Faris (1995) stated that the third date (15 April) was considered the most suitable period for best cowpea production with good quality i.e., weight, length and number of seeds per pod.

As for nitrogen fertilizers, seed number per pod, seed per plant, pod number per plant and seed index (weight of 1000 seeds) were substantially increased by increasing nitrogen levels. In addition, improving seed quality may be due to the increase in the amounts of metabolites synthesized by plant as well as the increase in number and weight of seeds per fruit accompanying N-application. Similar results were obtained by Anez and Tavira (1985); Hera *et al.* (1985) and El-Gizy (1990) on Bean. They also added that increasing N rates generally increased the number and weight of pods/plant and seeds yield/ha. With respect to the effect of interaction between different studied factors on seed quality i.e. seed number per pod, number of plant and seed index (weight of 1000 seeds) there were significant effect in this respect except seed number per pod in the first season.

In both growing seasons, data at Table (5) indicated high significant effect in dry seed weight i.e. per pod, plant, plot and feddan due to sowing on 31 May compared with 11 May and 20 June. These results might be attributed to the favorable effect of temperature and light during the period of reproduction processes, i.e., flowering, and growth of pods and seeds. Similar results were obtained by Abilon *et al.* (1977) they found that seed yield of bean was significantly related to energy factors in the climate. Also, Hall and Patel (1989) stated that reproduction processes of cowpea are more sensitive to heat than to vegetative growth. Besides, Samira and Faris (1995) reported that the heightest dry yield of cowpea production as well as pod characteristics, i.e., weight, length and number of seeds per pod were also enhanced by sowing dates.

As for nitrogen fertilizer, it is obvious that the higher of nitrogen fertilizer level resulted in a significantly greater in seed yield and its components, i.e. seed weight per pod, plant, plot and feddan. Increasing seed yield of cowpea with nitrogen application may be due to the simulative effect of these nutrients on plant metabolism. These results are supported by the findings of Leidi and Gomez (1980); Wistinghausen and Richter (1983); Anez and Tavira (1985); Mera *et al.* (1985) and El-Gizy (1990). They pointed out that seed yield of phaseouls vulgaris was significantly increased with increasing rate of N, they also added that increasing N rates generally increased the number and weight of pods/plant and seed yield/ha.

The interaction between sowing date and nitrogen fertilizer had a significant effect on seed yield and its quality in both two seasons.

**Germination test:**

Data dealing with the percentage of seed germination, germination rate, germination rate index, hepocotyle, misocotyle and seedling length, are provemental in Table (6) germination percentage, germination rate index and hepocotyle and seedling length produced due to seed sowing on 31 May apart resulted high significant values in both seasons. But sowing date had no significant effect on misocotyl length in this respect. Different results were reported by Chatterjee and Some (1990) and Anisa *et al.* (1995) on Bean.

**Table (5): Effect of planting dates and nitrogen levels on seed yield of cowpea plant at two seasons (1998 – 1999).**

| Treatments | | Seed weight plant gm. | | Seed weight plant gm. | | Seed weight plot Kg. | | Seed weight fedd. Kg. | |
|---|---|---|---|---|---|---|---|---|---|
| Planting dates | N. L. Kg/N fed. | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| 11 May | 0 | 1.41 | 1.38 | 10.91 | 12.31 | 1.72 | 0.88 | 321.20 | 396.60 |
| | 50 | 1.73 | 1.75 | 19.05 | 20.95 | 1.46 | 1.72 | 689.13 | 776.57 |
| | 100 | 1.80 | 1.84 | 21.57 | 23.84 | 1.52 | 1.86 | 778.10 | 839.93 |
| Mean | | 1.65 | 1.67 | 17.18 | 19.03 | 1.57 | 1.49 | 596.17 | 671.03 |
| 31 May | 0 | 1.43 | 1.48 | 11.35 | 13.21 | 0.71 | 1.02 | 385.10 | 462.97 |
| | 50 | 1.92 | 1.92 | 24.82 | 26.81 | 1.93 | 2.09 | 873.10 | 947.00 |
| | 100 | 2.08 | 2.00 | 29.16 | 29.94 | 0.87 | 2.50 | 1013.33 | 1129.47 |
| Mean | | 1.81 | 1.80 | 21.78 | 23.32 | 1.17 | 1.87 | 760.51 | 846.48 |
| 20 June | 0 | 1.27 | 1.36 | 8.87 | 10.80 | 0.71 | 1.04 | 405.63 | 472.00 |
| | 50 | 1.49 | 1.54 | 13.40 | 15.36 | 0.90 | 1.20 | 476.53 | 544.33 |
| | 100 | 1.65 | 1.71 | 16.34 | 18.45 | 1.28 | 1.68 | 661.97 | 758.47 |
| Mean | | 1.47 | 1.54 | 12.87 | 14.87 | 0.96 | 1.31 | 514.71 | 501.61 |
| Mean values of sowing dates | | 1.64 | 1.67 | 17.28 | - | 1.23 | 1.56 | 623.79 | 703.04 |
| Mean values of N Kg/fed. | | | | | | | | | |
| | 0 | 1.37 | 1.41 | 10.37 | 12.11 | 1.05 | 0.98 | 373.98 | 443.86 |
| | 50 | 1.72 | 1.74 | 19.09 | 21.04 | 1.43 | 1.67 | 679.59 | 755.98 |
| | 100 | 1.84 | 1.85 | 22.35 | 24.08 | 1.23 | 2.01 | 817.80 | 909.29 |
| L.S.D. at 0.05 | | | | | | | | | |
| Planting dates | | 0.22 | 0.17 | 0.94 | 1.27 | 0.13 | 0.09 | 48.01 | 40.87 |
| Nitrogen levels | | 0.14 | 0.18 | 1.14 | 0.85 | 0.19 | 0.20 | 70.56 | 89.97 |
| Interaction | | 0.31 | 0.22 | 1.97 | 1.47 | 0.25 | 0.34 | 122.21 | 155.84 |

**Table (6): Effect of planting dates and nitrogen levels on seed testing of cowpea plant at two seasons (1998 – 1999).**

| Treatments | | Germination % | | Germination rate days | | Germination rate index | | Hepocotyle length cm. | | Misocotyl length cm. | | Seedling length cm. | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Planting dates | N. L. Kg/N fed. | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 | 1998 | 1999 |
| 11 May | 0 | 72.0 | 76.0 | 1.20 | 1.23 | 0.200 | 0.209 | 9.10 | 10.00 | 8.27 | 8.37 | 17.37 | 18.37 |
| | 50 | 92.0 | 96.0 | 1.47 | 1.53 | 0.205 | 0.208 | 12.70 | 13.00 | 9.70 | 10.03 | 22.40 | 23.03 |
| | 100 | 92.0 | 96.0 | 1.50 | 1.53 | 0.209 | 0.210 | 13.30 | 13.60 | 9.97 | 10.07 | 23.27 | 23.70 |
| Mean | | 85.3 | 89.3 | 1.39 | 1.43 | 0.205 | 0.208 | 11.78 | 12.28 | **9.31** | **9.49** | **21.10** | **21.70** |
| 31 May | 0 | 76.0 | 80.0 | 1.23 | 1.30 | 0.205 | 0.207 | 10.00 | 10.50 | 9.10 | 9.33 | 19.10 | 19.53 |
| | 50 | 96.0 | 96.0 | 1.67 | 1.60 | 0.207 | 0.207 | 13.80 | 14.50 | 10.13 | 10.23 | 23.93 | 24.73 |
| | 100 | 100.0 | 100.0 | 1.60 | 1.63 | 0.211 | 0.205 | 15.00 | 16.20 | 10.83 | 11.00 | 25.80 | 27.20 |
| Mean | | 90.7 | 92.0 | 1.47 | 1.51 | 0.208 | 0.206 | 12.93 | 13.73 | **10.02** | **10.19** | **22.98** | **23.82** |
| 20 June | 0 | 68.0 | 72.0 | 1.20 | 1.17 | 0.194 | 0.214 | 8.30 | 9.10 | 7.10 | 7.13 | 15.30 | 16.23 |
| | 50 | 80.0 | 84.0 | 1.33 | 1.33 | 0.201 | 0.209 | 10.60 | 11.00 | 9.37 | 9.50 | 19.97 | 20.50 |
| | 100 | 88.0 | 88.0 | 1.43 | 1.43 | 0.203 | 0.209 | 11.80 | 12.20 | 9.57 | 9.67 | 21.37 | 21.87 |
| Mean | | 78.7 | 81.3 | 1.32 | 1.31 | 0.199 | 0.211 | 10.73 | 10.77 | **8.68** | **8.76** | **18.88** | **19.53** |
| Mean values of sowing dates | | 84.9 | 87.5 | 1.39 | 1.42 | 0.201 | 0.209 | 11.65 | 12.26 | **7.34** | **9.48** | **20.96** | **21.68** |
| Mean values of N Kg/fed. | | | | | | | | | | | | | |
| | 0 | 72.0 | 76.0 | 1.21 | 1.23 | 0.199 | 0.210 | 9.13 | 9.87 | 8.12 | 8.28 | 17.26 | 18.04 |
| | 50 | 89.3 | 92.0 | 1.46 | 1.49 | 0.204 | 0.208 | 12.37 | 12.83 | 9.73 | 9.92 | 22.10 | 22.76 |
| | 100 | 93.3 | 94.7 | 1.51 | 1.53 | 0.208 | 0.208 | 13.37 | 14.00 | 10.12 | 10.24 | 23.48 | 24.26 |
| L.S.D. at 0.05 | | | | | | | | | | | | | |
| Planting dates | | 4.1 | 1.3 | 0.02 | 0.06 | 0.006 | 0.002 | 0.56 | 0.60 | NS | NS | 2.76 | 0.83 |
| Nitrogen levels | | 2.0 | 4.1 | 0.06 | 0.05 | 0.007 | NS | 0.52 | 0.63 | 1.14 | 0.99 | 1.32 | 1.36 |
| Interaction | | 5.6 | 4.5 | 0.07 | 0.02 | 0.008 | NS | 0.58 | 1.10 | NS | NS | 4.23 | 2.14 |

It is clearly noticed from data shown in the same table that nitrogen fertilizer at 100 Kg N/fed. significantly increased germination percentage, germination rate, and hepocotyle, misocotyle and seedling length as compared with the other levels of nitrogen in both seasons. But significantly increased on germination rate index in first season was obtained.

The interaction between sowing date and nitrogen fertilizer had a significant effect on germination percentage, germination rate and hepocotyle and seedling length in both seasons. But significant effect on germination rate index was observed and insignificant effect on misocotyle length in both seasons was obtained.

## REFERENCES


Abllon, C.E.; Vives, F.L.A. and Chacon, Z.A. (1977). Climatic influence on bimass and seed production in bean (*Phaseolus vulgaris* L.) Agricola Fabio Bauclrit. M. 10(1) 26 pp.

Abo-Shetaia, A.M.A. (1990). Yield and yield components of faba bean (*Vicia faba* L.) to plant density and NP fertilization. Annals of Agric. Sci., Cairo 35(1): 187 – 204.

Anez, B. and Tavira, E. (1985). Foliar application of fertilizers in bean phaseolus vulgaris. Turrialba 35(2): 197 – 200.

Anisa, I.I.; Ragheb, W.S. and Samira, M.M. (1995). Effect of sowing date and plant spacing on seed yield and quality of climbing Bean (*Phaseolus vulgaris* L.) cv. serbo Grown under plastic Houses. Egypt. J. Hort. 22, (1), pp. 31 – 40.

Bartlett, M.S. (1937). Some examples of statistical methods of research in agriculture and applied. Soil J. Roy. Soc. 412.

Chatterjee, R. and Som, M.G. (1990). Effect of sowing date on growth and seed production of French bean cv. contender. Environment and Ecology 8(4): 1290 – 1292.

Cleland, K.W. (1957). Permeability of isolated rate heartsarcosmes. Nature, 176: 497 – 499.

El-Gizy, S.M. (1990). Effect of some fertilizer treatments on some features and productivity of common bean plants (*Phaseouls vulgrise* L.) Ph.D. Thesis Fac. Agric. Ain Shams Univ., Egypt, pp. 3, 166.

El-Shamma, H.A. (1998). Response of common Bean to NPK-Macro and Zn Micro-Nutriens applications vegetable crop. Menofiya J. of Agric. Res. Vol. 23, (4) pp. 1081 – 1095.

Hall, A.E. and Patel, P.N. (1989). Breeding heat, tolerant cowpeas, proceeding of the second southernpea (cowpea) workshop. American society of Horticultural Science 41 – 46.

Hera; Pepescu, A.; Blurlacu, G.; Petre, M.; Idriceonu, A.; Stencil, A.; Bologa, M. and Timirgazin, E. (1985). Some aspects on the nitrogen and phosphorus nutrition of Phaseouls vulgarize, Analel institutni de certetan pentru cereals si plante Tehnica Fundulea 52: 163–181. (c.f. Hort. Abst. 58, 4216).

Jackson, M.I. (1958). Soil chemical analysis. Prentice Hall, Inc. Englewood Cliffs, New Jersey, P. 498.

Leidi, E.O. and Gomez, M. (1980). Study of the influence of nitrates, on the growth and symbiotic nitrogen fixation in bean phoseolus vulgarize L. Anales de Edafologia Y Agrobiologia, 39 (11/12) 2175 – 2197 (Hort. Abst. 52, 4753).

Saharia, P. (1981). Effect of sowing date and raw spacing on growth and grain yield of green gram. Journal of research. Assam Agricultural University (1981) 2(2): 193 – 195. Field Crop 1984, 37, No. 11.

Samira, M.El. and Faris, F.S. (1995). Effect of sowing date on cowpea yields Egypt. J. Hort. 22, (1): pp. 81 – 88.

Shokes, F.M.; Herzog, D.C. and Right, L.D. (1983). Seed quality of soybean maturity groups as affected by planting dates in north Florida. Soil and crop science society of Florida Proceeding. 42, 117.

Snedecor, G.W. and Cochran, W.G. (1967). "Statistical Methods" 6th ed. Iowa State Univ. Press Ames Iowa, U.S.A.

White, J.C. and Mansfield, T.A. (1978). Correlative inhibition of lateral bud growth in phaseolus vnlgaris L. influence of the environmental Annals of Botany, 42(177) 191.

Wistinghausen, E.V. and Richter, M. (1983). Fertilizer type and the quality of vegetables. Revist de la faulted de Agronomia, universidad du Buenos, Aires, 4, 2, 123 – 134 (c.f. CAB, Abst. 50, 1754992).

## تأثير ميعاد الزراعة وكذلك معدل التسميد النيتروجينى علـــى النمـــو والمحصـــول وجودة البذور فى نبات اللوبيا٠

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نفذت تجربة حقلية بمزرعة البرامون خلال عامى ١٩٩٩، ٢٠٠٠ وذلك لتقييم الإنتاجيـــة لصنـف اللوبيا كريم ٧ وذلك من خلال ثلاث مواعيد للزراعة إبتداءاً من ٢٠ مايو وكل ٢٠ يوم متتالية وكـذا ثـلاث مستويات من التسميد النيتروجينى صفر، ٥٠، ١٠٠ كجم ن/للفدان فى صورة كبريتات أمونيا ونلاحظ الآتى: الميعاد المتوسط ٣٠ مايو أدى إلى تأثير ملحوظ لزيادة كل قياسات النمو وكذلك المحصول الأخضر والجـاف ومكوناتهما مثل دليل الإنبات وزن (١٠٠٠ بذرة) وعدد القرون على النبات، وكذلك اختبارات الإنبـات فـى البذور مثل نسبة الإنبات وسرعة الإنبات ودليل الإنبات بالإضافة لطول الريشة العليا وطول البادرة٠

ومن جهة أخرى الميعاد الأخير من الزراعة ٢٠ يونية كان أكثر تأثيراً على عدد البذور فى القـــرن وعلى النبات٠

وعلى أية حال كان هناك زيادة معنوية فى جميع مقاييس النمو والمحصـــول الأخضـــر والبـذرى ومكوناتها والجودة٠

ويمكن النصح بزراعة بذور اللوبيا فى ٣١ مايو مع التسميد بمعدل ١٠٠ كجم ن/للفـدان للحصـول على أحسن محصول أخضر وبذرى من الكمية والجودة٠