EFFECT OF PLANTING DATES ON THE GROWTH, FLOWERING AND SEED PRODUCTION OF SOME ANNUALS

By

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INTRODUCTION

The flower production in the Arab Republic of Egypt is comparatively recent. With the increasing local and export demands, commercial flower production developed to an extent that many of its aspects needed to be explored. Increasing our knowledge through the experimental work on the local problems would be of great importance; especially that some are basic and fundamental for optimum growth.

The suitable planting dates are important practices that might affect the vegetative growth, flowering and seed production. This work was carried out to determine their effects on four well known winter annuals: Antirrhinum majus, L., Delphinium belladonna, Hort., Ranunculus asciaticus, L., and Matthiola incana, R. Br. with the aim to obtain the best growth, flowering and seed production.

REVIEW OF LITERATURE

Effect Of Sowing Date

Post (1955) reported that the seeds of Antirrhinum majus for winter crop in New York, U. S. A. were planted during June or July, and those started in August or September flowered after February.

De Souza (1958) in Brasil, found that the seeds of Antirrhinum majus could be sown from March to August (autumn - winter). Maatsch and Rünger (1960) in West Germany, found that when the two varieties of Antirrhinum majus named Navajo and Delworth-Supreme were sown at intervals of 15 days from February until August, the time taken to flowering decreased throughout this period until May, while the inhibition of lateral shoot formation became more pronounced. With sowings from May until the 15th of July, both the time required from development and the degree of lateral shoot formation remained fairly constant. The plants sown in August took a very long time to flower. Stene (1964) found that there was little difference between germination of seeds stored for one month and seeds sown at the end of February. After two months storage, there was some unevenness in germination, but several species (snapdragon, lobelia, pansy and sweet pea) germinated as quickly after 3 months of cold storage at 2 - 3°C. as when their seeds were sown in the spring.

Post (1955) reported that the seeds of delphinium should be planted from September 1 to 15 for spring production in New York. Farther south and in California, the planting date should be later than this. In Florida and southern Texas, it is probably not safe to plant before late November. The best flowers were produced from seeds of Ranunculus asiaticus planted during April or May; the seedlings were transplanted directly to the benches or beds in which they would flower. Seedlings produced few flowers in October, reaching the peak of production in March and April.

Effect Of Light And Temperature

Post (1955) stated that the winter flowering Antirrhinum majus varieties vegetated and flowered under any day length, but the longest stems were produced during January, February, and March. It was evident that even these winter-flowering kinds produced more vegetative growth during the short days than during long days of summer. It was entirely possible that a day length of less than 10 hours would cause many winter-flowering varieties to produce no flower buds. Plants of *Antirrhinum majus* grew poorly in dark houses. Long days and high light intensity stimulated total growth and hastened maturity. The best temperature for growing *Antirrhinum majus*, was 48° to 50° F. at night. Higher temperatures hastened flowering but reduced spike and stem length.

Mc. Laughlin (1952) found that under conditions of low intensity in January, *Antirrhinum majus* plants kept continuously at 40° or 50° F. produced few "spikes". When the plants were shaded in April, the spike stems were flattened, hollow and weak. Miller (1959) stated that exposing *Antirrhinum majus* seedlings in the green house to temperature of 60° or 70° F. for a short period, when they were small, caused the plants to flower earlier and produced larger blossoms than did the usual practice based on a minimum night temperature of 50° F. The earliest flowering was obtained by exposing the small seedlings to temperature of 70° F. for 4 weeks after potting up and before planting in a green house at 50° F. Prolonging high temperatures to the flowering stage proved determinal. According to Tayama and Kamp (1960) both Christina and Golden Spike *Antirrhinum majus* flowered earlier when grown at 60° F. than at 55° F., but the length and quality of inflorescences were much better at the lower temperature, particularly with the variety Christina. Maginnas and Langhans (1960) found that the number of days from germination to harvest for *Antirrhinum majus* were greater in day length of 9 - hours than in 18 - hours days. Short days produced flowers that were one grade higher in quality than those grown under long days. Increasing the temperature from 50° to 70° F. decreased flower quality in 18-hours days but did not affect the quality in the 9-hour days. Link and Shanks (1962) found that the varieties of winter and summer *Antirrhinum majus* flowered with continuous light at 60° F., but their flower spikes were smaller than those of plants grown at lower temperatures and with interrupted light. In a temperature study, the flowering was earlier with plants grown at 60° F. for 3 or 6 weeks after pinching and then at 50° F. than with plants growing at 60° F., earlier flowering occurred where long days were given for the first 3 or 6 weeks after pinching than where long days were given for 9 or 12 weeks. Miller (1962) found that the dry weight data for *Antirrhinum majus*

Post (1955) reported that Delphinium ajacis rosetted at temperatures below 55°F. The axis elongated and flowers appeared at higher temperatures. An increase in the day length increases the rate of growth of the axis, and at 50°F. stimulates axis elongation similarly to that at a higher temperature. He also reported that Matthiola incana did not form flower buds in winter if they were exposed to a minimum temperature of 65°F. for more than 6 hours of the day. Flowers were obtained two weeks earlier than normal in winter by increasing day length after low temperature had caused buds to form. Iwai and Iwama (1953) experimented with Matthiola incana and stated that for cut flowers for christmas, sowing should take place in mid July at 700 - 800 m. attitude and the seedlings should be moved to warmer areas or conditions early in October. Kohl. (1958) stated that low temperature treatment for Matthiola incana, to be effective, must be given immediately before flower initiation. The apical meristem continued to initiate the flowers after initiation had started even at warm temperatures. Tayama and Kamp (1960) found that rosetting of Matthiola incana occurred in the plants grown continuously at 65°F. The plants grown continuously at 60°F. bloomed earliest and also had the longest stem length, and those finished at 60°F. produced the longest inflorescences with the highest flower stem weight. In general, a continuous temperature of 60°F. gave more favourable results than any of the other combinations. In 1960, they also found that a high initial temperature retarded bloom in both varieties (Ball apricot and Ball white) of <u>Matthiola</u> <u>incana</u>. Plants sown on the 10<u>th</u> of February developed best when held at constant temperature of 60°F., the autumn - sown plants grew and flowered best when started at 55°F. and finished at 60° .

Semeniuk (1958) stated that the production of fruits and seeds of <u>Matthiola</u> <u>incana</u> per plant was greater at 65°F. than at (55, 75° and 85°F.). The plants maintained at 85°F. were entirely sterile and the pollens obtained were 91 % empty and failed to germinate. Plants maintained at 75°F. produced shorter tubes than the pollen from plants in the 55°F. and 65°F. chambers. At 85°F., most of the anthers failed to dehiscence. The plants in the 85°F. chamber were female-sterile as well as male-sterile. A highly significantly reduction in seeds at both 75°F. and 55°F. as compared with 65°F. Semeniuk and Stewart (1963) found that the short period (1 - 4) days of high temperature 85°F. at various intervals after pollination of

Matthiola incana flowers at 65°F., significantly decreased the yeild of seeds. In 1960 they also experimented with Antirrhinum majus, Mathiola incana and other plants and reported that the fruits and seeds were formed on Antirrhinum majus grown at 50°F. and 60°F but not at higher temperatures. Mathiola incana produced no fruits or seeds, at 90°F., very few at 80°F. and a maximum number at 60°F. Quagaliotti (1963) worked on Antirrhinum majus and found that the earliest harvested Antirrhinum majus (20 July) was the heaviest and contained the greatest weight of seeds and the highest viability. There was a steady decline in germination capacity as the ripening date became later.

Post (1955) found that the best flowers of Ranunculus asiaticus were produced at a night temperature of 40°F., and no shade. Higher temperature spead production, but the flowers were smaller and borne on shorter stems.

MATERIALS AND METHODS

The seeds of four winter annuals were selected for uniformity from the local plants grown at Qubba Botanical Gardens, in Cairo, Arab Republic of Egypt. The winter annuals used were :

1. *Antirrhinum majus*, L. belongs to the *Scrophulariaceae* family. It is an annual plant with lanceolate or oblong lanceolate leaves. The flowers are in elongated terminal spikes and are red in color.

2. *Delphinium belladonna*, Hort belongs to the *Ranunculaceae* family. The leaves are palmate, parted in five sections to the base. The flowers are light blue in racemes. It is treated as an annual in A. R. E.

3. *Ranunculus asiaticus*, L. belongs to the *Ranunculaceae* family. The leaves are compound and the leaflets - with narrow divisions - are dentate at apex. The flowers are few on long peduncles and the petals are obovate, rounded with many color.

4. *Matthiola incana*, R. Br. belongs to *Cruciferae* family. The stems are stiff, woody with narrow petiole - like

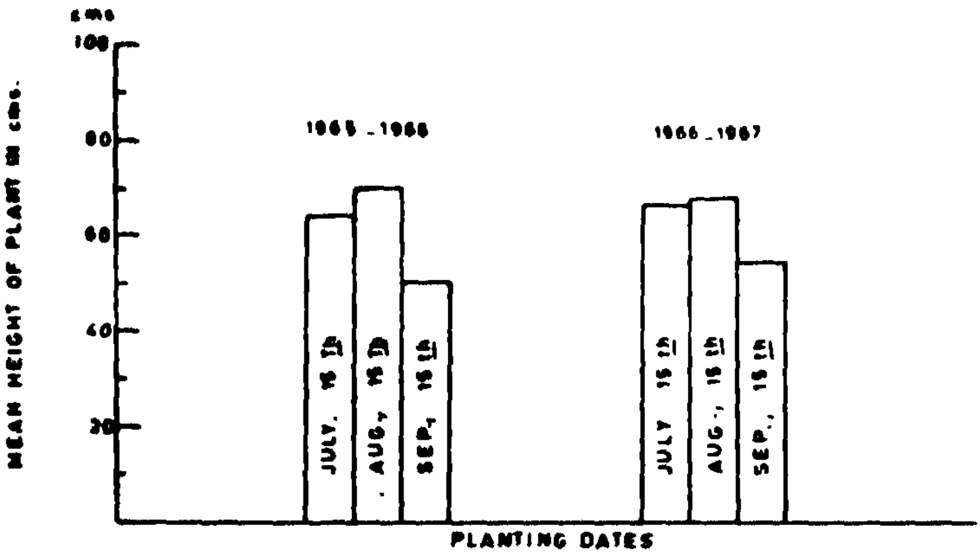

FIG.(1) EFFECT OF PLANTING DATES
ON THE HEIGHT OF ANTIRRHINUM MAJUS PLANTS

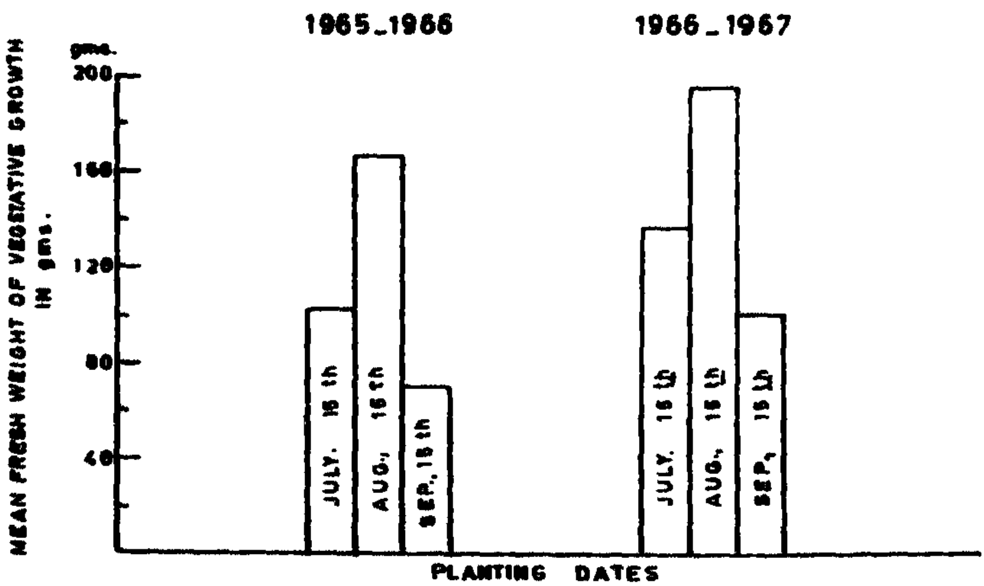

FIG.(2) EFFECT OF PLANTING DATES
ON THE FRESH WEIGHT OF ANTIRRHINUM MAJUS PLANTS

The August sowing also produced larger stem diameter of the plants than the other sowings, as shown in Table 1 and Figure 3, although the differences were not statistically significant.

The root system weights decreased as the date of sowing was later. The July sowing produced larger roots than August, although the differences were not statistically significant. The September sowing resulted in the least root system of the plant .

The number of leaves on the flower stem of 28.23 with the August sowing was more than both 23.39 for the July and 26.12 for the September, as in Figure 4, but the differences were not statistically significant.

The length, width and area of leaves were significantly largest with the August sowing than with both July and September ones. The leaves were more than twice in area with the August sowing than with July and more than three times those of September, as shown in Table 1 and Figure 5.