

RESPONSE OF DIFFERENT SOWING DATES ON THE GROWTH AND YIELD OF CAULIFLOWER

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ABSTRACT

The effect of sowing date on the growth and yield of cauliflower was studied under the Agro climatic conditions of Juglote, Gilgit, Northern Areas of Pakistan during 2003. Five sowing dates were used in this study. Significant variations were observed in different growth and yield parameters among the sowing dates. Second sowing date (16th June) statistically showed maximum fresh plant weight (2.6 kg plant⁻¹), head weight (1.4 kg plant⁻¹), number of marketable heads (27.00 plot⁻¹) and head yield (37.83 t ha⁻¹). Therefore 16th June proved to be the optimum sowing time for cauliflower Cv.Snow Ball, in Juglote, Gilgit, Northern Areas of Pakistan.

INTRODUCTION

Cauliflower (*Brassica oleracea L.*) is grown for its white tender, head or curd formed by the shortened flower parts. Cauliflower thrives best in a cool moist climate. It does not withstand very low temperature or too much heat as well cabbage. Cauliflower heads will not develop well in hot weather, for this reason it is grown mostly the fall and winter. The optimum temperature where the cauliflower withstands is 10 to 15°C. In regions where freezes does not occur, planting may be done at any time of the year if water is available for growing the crop. In regions where hard freezes occur well-hardened plants may be set out as early in the spring as the ground can be prepared or as soon as the danger of hard freezes is over.

The increase in yield per acre is due to many factors but primarily due to better production practices resulting from specialization by growers. The average yield produced in Northern Areas is far below than the yields produced in other parts of the country. This low yield may be due to the improper agronomic practices or use of improper mineral fertilizer to the crop. The current research was conducted to evaluate the impact of sowing date on the growth and yield of cauliflower. It is therefore, imperative to examine the sowing date in cauliflower in light of best sowing date technology. The present study was undertaken to evaluate the effect of different sowing dates on the growth and yield characteristics of cauliflower.

MATERIALS AND METHODS

This research study was conducted at Karakoram Agricultural Research Institute for Northern Areas during 2003. During the field preparation soil sample up to 25cm depth were obtained for chemical analysis. These samples were analyzed for soil texture, lime contents, organic matter, N, P, K and pH in the laboratory of the soil section of National Agricultural Research Center Islamabad. The

physicochemical characteristics of the experimental site are given below.

Texture	sandy loam
Lime content	6.30%
Organic matter	0.8%
Nitrogen	0.45%
P ₂ O ₅	140mg kg ⁻¹
K ₂ O	93mgkg ⁻¹
pH	7.5

The experiment was laid out in a Randomized Complete Block Design (RCBD) with four replications and five treatments. The plot size was 10m² row-to-row distance was 50cm and plant-to-plant distance was 45cm. The seeds were collected from National Agricultural Research Center Islamabad. Seeds were sown in the nursery beds with the interval of 15 days (1st June, 16th June, 1st July, 16th July and 31st July 2004). During the preparation of nursery beds well-rotted FYM was added. The beds were made 10cm raised from the soil surface to provide good drainage for the removal of surplus irrigation. The seeds were sown in 10 cm apart and were covered with fine and well-rotted FYM. Beds were immediately misted with the help of sprinkler and all the bed was covered with wheat straw. After three days germination of seeds started and completed after six days. Irrigation was given with the interval of three days with the help of sprinkler. When the seedlings attained the height of 3 cm, thinning was done to get healthy and strong seedlings. After thirty-six days, transplantations of the seedlings started with the interval of 15 days at evening time from the nursery beds to the field. Healthy seedlings of uniform size were selected for the transplantations. The seedlings were planted in the field spaced at 50 cm row to row distance and 45cm plant to plant. Before transplantation the

nursery beds were irrigated so that the seedlings could be easily taken out from the beds with out damage to the roots. After one-week of transplantation dead seedling (5%) were replaced by planting fresh seedlings, to obtain a uniform stand. Full dose of P_2O_5 (90kg^{-1}) as single super phosphate (SSP) and K_2O (60kg^{-1}) as sulphate of potash (SOP) with half dose of N (60kg^{-1}) was applied at the time of soil preparation through broadcast, while the remaining N was applied 30 days after transplanting as urea. After transplantation the experimental field was irrigated and the second irrigation was applied 3-days after transplantation. After this, irrigation was given at 4-6 days interval up to the harvest of crop. First hoeing and weeding was done 20 days after transplantation and the two more weedings were done at the interval of one month. When the head formation started cabbage aphid (*Aphis brassicae*) appeared on the later part of cauliflower and were controlled with the spray of Karate at the rate of 1.5 cc/liter water. The attack was most serious in the last sowing of cauliflower. Crop was harvested when the heads attained the proper size. For the determination of total fresh plant weight, five randomly selected plants in each treatment were weighed and then average total fresh plant weight was calculated. For the determination of head weight five plants were randomly selected and their heads were weighed to calculate the average head weight per plant. For the determination of the head diameter per plant, five heads from each treatment were randomly selected and their circumferences were determined by measuring tape and the diameter of the heads were obtained with the help of the following formula.

$$\text{Diameter} = \text{circumference}/3.14$$

In each treatment all the heads, which were 1kg or more in weight, were considered as marketable heads and their number per treatment was converted to number of marketable heads/ha.

RESULTS AND DISCUSSION

Total Fresh Plant Weight

The effect of the main treatments and their interactions were significant for fresh plant weight (Table I). Sowing date on 16th June produced a fresh plant weight (2.60kg plant^{-1}) higher than that obtained from sowing June 1st sowing (2.23kg plant^{-1}), but the later sowings on 1st July, 16th July and 31st July significantly reduced fresh plant weight by 1.80kg, 1.25kg and 0.86kg respectively. The serious yield reduction beyond 16th June in the experiment

may be explained on the basis of temperature pattern prevailing in the region. Ghanti-P and Sc-Malick. (1994) reported that highest stem and curd area were obtained with early plantation.

Head Weight

Head weight was significantly affected by sowing dates (Table I). Cauliflower sown on 16th June produces large heads (1.38kg plant^{-1}) than the other sowing dates. Ashok, *et al.* (1995) reported that early planting recorded large sized leaves and more days to curd maturity, besides producing compact white curds. The curd size and weight were also greatest in the early plantings.

Head Diameter

Head diameters were markedly enhanced by sowing seeds on early date (1st June) in comparison with the late sowing crop (31st July). In the early sowing date head's diameter was 15.19 cm while in the late sowing date head's diameter was 5.50 cm (Table I). A serious deduction in head diameter was noted with later sowing date. Jaiswal, *et al.* (1996) reported that greatest curd and curd weight (16cm diameter and 832g) were found in early sown plants (13cm diameter and 532g).

Number of Marketable Heads

The number of marketable heads is an important yield-contributing factor of cauliflower, which is significantly influenced by the prevailing growing conditions of a crop. Significant differences were in the number of marketable heads between sowing dates (Table I) The 2nd sowing date (16th June) produces more marketable heads (26.00 plot^{-1}) while the minimum heads (17.6 plot^{-1}) were obtained from the last sowing date (1st July).

Head Yield

The effect of the sowing date was significant for head yield (Table I). 2nd sowing date (16th June) produced a head yield (37.83t ha^{-1}) higher than that obtained from the last sowing date (1st August) of a head yield (3.25t ha^{-1}). The serious yield reduction beyond 16th June sowing date as obtained in the experiment may be explained on the basis of temperature pattern prevailing in the region. Plant sown after 16th June faced a rapid fall in temperature whereby the head formed, the heads before attaining the critical plant size. Castillo, *et al.* (1991) observed that the short growing cycle in winter cultivars both stages (curd and seed yield) were decreased by later sowing dates.

Table I Means of various growths and yield parameters for five different sowing dates of cauliflower

Treatment	Fresh weight (kg/plant)	Head weight (kg/plant)	Head diameter (cm)	No. of marketable heads/plot	Yield (T ha ⁻¹)
1 st June	2.23 _{ab}	1.13 _a	15.19 _a	26.00 _a	30.28 _{ab}
16 th June	2.60 _a	1.38 _a	13.86 _{ab}	27.00 _a	37.83 _a
1 st July	1.80 _{bc}	0.65 _b	11.92 _{bc}	24.60 _a	15.80 _{bc}
16 th July	1.25 _{cd}	0.59 _b	10.13 _c	21.00 _b	20.99 _b
31 st July	0.86 _d	0.28 _c	5.50 _d	12.00 _c	3.25 _c
LSD (0.05)	0.71	0.30	2.54	2.41	14.83

CONCLUSION AND RECOMMENDATION

The field experiment revealed that the yield (kg ha⁻¹) of cauliflower was significantly affected by different sowing dates. The maximum yield of 37.83t ha⁻¹ of cauliflower planted on 16th June was recorded, while the lowest yield of 3.25t ha⁻¹ was produced when the crop was planted on 31st July, while maximum number of marketable heads (plot⁻¹), head diameter (cm) and head weight (kg plant⁻¹) were produced when the cauliflower was planted on 1st and 16th June while minimum were produced when the crop was

planted on 1st, 16th and 31st July under the agro-ecological conditions of Juglote, Gilgit, Northern Areas. Hence the month of June was found the most suitable planting time for cultivation of cauliflower at KARINA Juglote, Gilgit.

The recommendation derived from this study is that June is the most appropriate and suitable sowing time for cauliflower cultivation under the agro-ecological conditions of Juglote, Gilgit.

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