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Effect of Dates of Sowing on Growth and Physiological Parameters of Garden Cress (*Lepidium sativum* L.)

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ABSTRACT

The present investigation entitled "Effect of Dates of Sowing on Yield and Quality of Seeds in Garden Cress (Lepidium sativum L.)" was carried out at Medicinal and Aromatic Plant Research Station, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during the year of 2015-2016. Among the different 8 dates of sowing (15th September, 30th September, 15th October, 30th October, 15th November, 30th November, 15th December and 30th December) with 3 replication. The plant height (86.34 cm), number of primary branches (21.20), Days to 50% flowering (22.60), Dry matter accumulation plant^{-1} (8.80 g) in garden cress was recorded maximum in 30th October sowing compared to early and late sowing dates. During 60 DAS LAI (0.52), 60 DAS to harvest stage CGR (0.568 g m^{-2} day^{-1}) and 30 DAS -60 DAS stage RGR (0.083 g g^{-1}day^{-1}) recorded maximum values with 30th October sowing.

Key words: *Garden cress, Dates of sowing, Growth and Physiological parameter.*

INTRODUCTION

Garden cress (*Lepidium sativum* L.) is an erect annual edible herb belonging to the family Cruciferae. This is commonly known as 'water cress' or 'common cress' or 'pepper cress'. It has many regional names like Chandrasur (Hindi), Adeli / Adityalu (Telugu), Alavibija (Kannada), Aleveri (Bengali), Tezak (Punjabi), Asalio (Gujarathi). It is a polymorphous species and is believed to be originated primarily in the high land region of Ethiopia and Eritrea. Seeds, leaves and roots are economic parts of this crop. The crop is mainly cultivated for seeds. It is cultivated in India, North America and parts of Europe. In India, it is grown mainly in Uttar Pradesh, Madhya Pradesh, Rajasthan, Gujarat, Maharashtra and Tamil Nadu for seeds[3]. The seed contains alkaloids like lipidin, glucotropaeolin besides sinapinic acid, mucilaginous matter (5%) and uric acid (0.108g/kg). Seeds also contain vitamin C and vitamins of B group. The seeds yield yellowish brown semi drying oil with a peculiar disagreeable odour.

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The composition of seed is; moisture (5.69%), protein (23.5%), fat (23.5%), ash (5.7%), phosphorous (1.65%), calcium (0.31%) and sulphur (0.9%)[11]. Seeds also contain mucilage which consists of mixture of cellulose (18.3%) and uronic acid containing polysaccharides. The seeds of this plant have been used in Ayurvedic, Unani and Siddha systems of medicine since ancient times. Seeds are bitter, thermogenic, depurative, rubifacient, galactogouge, tonic, aphrodisiac, ophthalmic, antiscorbutic, antiasthamatic and diuretic skin disease, dysentery, diarrhoea, splenomegaly, dyspepsia, lumbago, leucorrhoea, scurvy and seminal weakness[4]. Seeds are also used for increasing milk yield in animals and human beings and curing chronic bronchial asthma. They are boiled with milk and are used to induce abortion[2]. Presently, cultivation of the crop is mainly confined to North Indian states. However, due to increase in its usage, besides an assured remuneration, there is a need to expand the area under this valuable medicinal crop. Hence, there is a need to do research on location specific sowing season of the crop for obtaining the quality seed.

MATERIAL AND METHODS

The experiment is laid out in Randomized Block Design (RBD) with 8 treatments and 3 replications; experiment involves 8 dates of sowing as treatments. The soil type is sandy loamy and the experimental plot size was 3×2 m^2 and the spacing was 30 cm between the lines. The crop was fertilized with the recommended Nitrogen, Phosphorus and Potassium (NPK) schedule of 50:30:30 kg ha^{-1} that was applies basally prior to sowing of seeds except 50 kg ha^{-1} N which was applied as top dressing after 30 days of sowing and light earthing up was done. Timely weeding was done to keep the plot weed free and irrigation was given depending on soil moisture conditions, plant protection measures were also taken to control the incidence of pest and diseases during crop growth. Five plants were randomly selected by avoiding the border plants and were labeled for recording the observation at 30, 60 days after sowing (DAS) and at harvest. The following observations growth parameters *viz.*, plant height (cm), primary branches per plant, dry matter accumulation per plant (g) at 30, 60 days after sowing (DAS) and at harvest and days to 50% flowering. Absolute Growth Rate (AGR), Relative Growth Rate (RGR), Cumulative Growth Rate (CGR) were calculated by using the following formulae.

$$AGR = \frac{h2 - h1}{t2 - t1}$$

$$RGR = \frac{(\text{Log e } W_2 - \text{Log e } W_1)}{(t_2 - t_1)}$$

$$CGR = \frac{(W_2 - W_1)}{(t_2 - t_1)} X \frac{1}{A}$$

Where, W1 = Dry weight of the plant at time t1 W2 = Dry weight of the plant at time t2

h_1 = Plant height at time t h_2 = Plant height at time t_2

Log_e - Logarithm to the base e A = Land area

The data was analyzed by using OPSTAT in RBD.

RESULTS AND DISCUSSION

Growth parameters

The growth parameters were significantly influenced by different dates of sowing. The October 30th sown (T_4) crop gave significantly recorded maximum plant height at 30, 60 DAS and At harvest (13.68, 74.50 and 86.34 cm respectively), number of primary branches

recorded at 30, 60 DAS and At harvest (8.80, 14.40 and 21.20 respectively) and Dry matter accumulation recorded at 30, 60 DAS and At harvest (0.45, 3.64 and 8.80 g/plant respectively) (Table 1) .This might be due to favourable weather conditions pervailed during their growing stages, which influenced the plants to grow taller by increasing cell division and cell elongation, where as the plant height was observed to be less in both early and delayed dates of sowing. Favourable weather conditions helped in formation of more lateral buds resulted in more number of branches plant^{-1} these results are in consonance with the study of Meena *et al.*[6], Yadav *et al.*[10], in garden cress and Soleimani *et al.*[9], in ajowan.

Days taken for 50% flowering was significantly minimum (22.66) in 15th October sowing (T_3) which was significantly superior to others followed by 30th October (T_4) (25.73) this might be due to that the long day conditions might have favoured the flowering in garden cress[7].

Physiological parameters

Leaf area index was recorded on 30th October sown crop (T_4) at 60 DAS (0.51) followed by 30 DAS (0.37) (Table 2.). The LAI at harvest will be reduced due to natural senescence of older leaves. Increased LAI will result in greater light interception by the crop which might have contributed for the vegetative growth of crop. Similar results were observed in Isabgol when seeds were sown in November resulting in maximum LAI followed by October sowing[5], whereas Yadav *et al.*[10], maximum LAI in garden cress when sown on 31st October.

There was significant effect of different dates of sowing on AGR recorded at 30-60 DAS (Table 2.) crop sown on 30th October (T_4) recorded maximum AGR (2.014 g day^{-1}) and minimum AGR (1.034 g day^{-1}) was recorded when crop was sown on 15th September sowing (T_1). Absolute Growth Rate did not differ significantly among different dates of sowing during 60 DAS- harvest stage (Table 2.). Maximum AGR was observed during early stages and this might be due to the congenial weather conditions which resulted in robust growth of the plants and higher dry matter accumulation.

CGR recorded at both growth stages *i.e.*, on 30 DAS – 60 DAS (0.349 g m^{-2}day^{-1}) and 60 DAS to harvest (0.568 g m^{-2} day^{-1}). Similarly RGR recorded at both growth stages *i.e.*, on 30 DAS – 60 DAS (0.083 g g^{-1}day^{-1}) and 60 DAS to harvest (0.043 g g^{-1}day^{-1}) it recorded maximum values for 30th October sowing (T_4) (Table 2.). RGR was recorded to be maximum during the early vegetative stages and decline with the advancement of growth stages. This might be due to the photosynthates produced in the leaves were rapidly consumed by plant in reproductive phase. These results are in agreement with Yadav *et al.*[10], Saraswathi *et al.*[8], Meena *et al.*[6], in garden cress at and Ahirwar *et al.*[1],in Isabgol.

Table 1: Effect of dates of sowing on growth parameters in garden cress

Treatments	Plant height (cm)			No. of primary branches			Dry matter accumulation/plant (g)			Days to 50% flowering
	30 DAS	60 DAS	At Harvest	30 DAS	60 DAS	At Harvest	30 DAS	60 DAS	At Harvest	
T_1 -15th September	7.62	38.71	52.33	5.20	10.33	11.40	0.15	1.62	4.92	27.06
T_2. 30th September	9.86	48.54	57.32	6.60	11.06	14.00	0.16	1.89	5.20	27.30
T_3- 15th October	12.96	52.13	62.92	7.30	12.0	16.80	0.41	3.46	8.41	22.66
T_4- 30th October	13.68	74.50	86.34	8.80	14.40	21.20	0.45	3.64	8.80	25.73
T_5 . 15th November	13.16	65.34	85.02	7.90	13.80	17.06	0.27	2.40	7.31	26.23
T_6 – 30th November	12.86	56.10	70.92	7.20	13.46	16.40	0.25	2.35	7.05	27.00
T_7 – 15th December	11.43	53.20	64.72	6.50	11.06	15.80	0.22	2.10	6.18	27.40
T_8 – 30th December	8.78	41.46	52.82	6.40	10.73	15.20	0.17	1.93	5.10	28.06
S Em ±	0.35	1.91	1.34	0.32	0.50	0.47	0.005	0.067	0.057	0.43
C D (p= 0.05)	1.07	5.81	4.07	1.001	1.51	1.43	0.017	0.20	0.17	1.33

Table 2: Effect of dates of sowing on physiological growth parameter of garden cress

Treatments	Leaf area index		AGR (g day^{-1})		CGR (g $m^{-2}day^{-1}$)		RGR (g $g^{-1}day^{-1}$)	
	30 DAS	60DAS	30-60 DAS	60 DAS - At harvest	30-60 DAS	60 DAS - At harvest	30-60 DAS	60 DAS - At harvest
T_1 -15th September	0.29	0.42	1.034	0.273	0.168	0.357	0.051	0.023
T_2- 30th September	0.30	0.46	1.280	0.288	0.189	0.362	0.058	0.024
T_3- 15th October	0.36	0.50	1.290	0.305	0.334	0.542	0.082	0.035
T_4- 30th October	0.37	0.52	2.014	0.391	0.349	0.568	0.083	0.043
T_5 - 15th November	0.35	0.49	1.994	0.385	0.232	0.538	0.071	0.034
T_6 – 30th November	0.33	0.47	1.430	0.381	0.225	0.518	0.061	0.031
T_7 – 15th December	0.26	0.43	1.380	0.369	0.205	0.451	0.055	0.026
T_8 – 30th December	0.26	0.41	1.087	0.362	0.191	0.348	0.050	0.021
SE m ±	0.0016	0.005	0.063	0.039	0.006	0.03	0.0013	0.00133
C.D (p=0.05)	0.005	0.0175	0.193	N.S.	0.018	0.012	0.0040	0.00405

CONCLUSION

The study concluded that October month sowing recorded the maximum growth and was on par with November month. The environmental condition prevailed during this months enhanced the growth and physiological parameters. Hence for garden cress, October and November months sowing are suitable months for better growth.

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