Original Research Article

Effect of Irrigation scheduling and level of nitrogen on Chandrasur (*Lepidium sativum*) in Zone III-B of Rajasthan

ABSTRACT: The present study was carried out to investigate the effect of irrigation and nitrogen levels on growth and yield of Chandrasur (*Lepidium sativum*) in two consecutive years Rabi 2018-19 and Rabi 2019-20 at Krishi Vigyan Kendra, Sawaimadhopur. Results revealed that higher yield attributes, No of branches plant^{-1}, Fresh weight at harvest (g plant^{-1}), 1000 seed weight (g), plant height (cm) were found significantly higher under three irrigation (25, 50 and 75 DAS) which was at par with two irrigations (25 & 50 DAS) and with 80 kg of N ha^{-1} which was at par with 60 kg N ha^{-1}. Under different level of irrigations application of three irrigation (25, 50 & 75 DAS recorded higher seed yield (1593.34 kg ha^{-1}), which remained at par with two irrigation (25 & 50 DAS) compared to one irrigation at 25 DAS, respectively. In sub plot treatments of different nitrogen levels, application of 80 kg of N ha^{-1} resulted in highest yield (1586 kg ha^{-1}) which was statistically at par with 60 kg of N ha^{-1} as compared to 40 & 20 kg N ha^{-1} respectively.
Key Words:- Chandrasur, Garden Cress, Irrigation level, Nitrogen Level.

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INTRODUCTION

Garden cress (*Lepidium Sativum*) is commonly known as Chandrasur. It is fast growing annual herb. It belongs to family Brasiccaceae. It is a annual herb and medicinal plant which grows annually and equivalently distributed in India, United states, and Europe and cultivated in hot temperature climates across the world for many culinary and medicinal purposes. These seeds commonly called “Aliv” in Marathi, “Halim” and “Chandrasur” in Hindi and “Asali” in Malayalam. (Singh and Paswan, 2017). Garden cress is rich source of Iron , folate , Carotenoids, Vit A, Vit C, Vit E, Fiber, flavoinoids, Selenium, Sulfoxides and Glucosinolates, Omega 3 fatty acids and other essential nutrients and phytochemicals. Nitrogen levels and Irrigation are the limiting factors in increasing the productivity of Chandrasur. Its plant growing upto height of 15 to 45 cm and erect and glabrous. In India from ancient times garden cress has been used in traditional medicine, (Mali *et al.*, 2007). Its seeds are galactogogue, bitter, thermogenic, depurative, rubefacient, aphrodisiac, ophthalmic, antiscorbutic, antihistaminic, diuretic and act as tonic. Various diseases such as asthma, coughs with expectoration, diarrhea, dysentery, poultices for sprains, leprosy, skin diseases, splenomegaly, dyspepsia, lumbago, leucorrhoea, scurvy and seminal weakness can be treated using garden cress seeds, (Kirthikar *et al.*, 2011). Garden cress seed has 46.8 % PUFA (poly unsaturated fatty acids) and 37.6% MUFA (Mono unsaturated fatty acids) (Raghavendra *et al.*, 2011). Chemical and nutritional composition of garden cress seeds contains protein (24±0.5), lipids (23.2 ± 0.2), carbohydrates (30.7 ± 1.2), fibre (11.9 ± 0.4), ash (7.1 ± 0.1) and moisture (2.9 ± 0.1) (Zia-Ul-Haq *et al.*, 2012).

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For higher agricultural production fertilization is the important input added externally. When it is not applies adequately it may cause significant reduction in Yield and quality. Water

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management is also a necessary agronomic practice which effects the yield of garden cress. Therefore the present study was carried out to find out appropriate irrigation and nitrogen level for chandrasur.

MATERIAL AND METHOD

A field experiment was conducted in the *rabi* season of 2018-19 & 2019-20 at krishi Vigyan Kendra, Sawaimadhopur under Zone III B. The experiment design was laid out into Split plot design and divided into Main and subplot which were replicated four times. Main plot consists 3 irrigation levels Irrigation (One at 25 DAS) (I_1), Two Irrigations (at 25 & 50 DAS) (I_2), & Three irrigations (25, 50 & 75 DAS) (I_3) and sub plot consists four different levels of nitrogen i.e 20kg N ha^{-1}, 40kg N ha^{-1}, 60kg N ha^{-1} and 80kg N ha^{-1}. Dose of nitrogen were applied in split doses half dose of nitrogen at the time of sowing and half at after first irrigation through urea. Full dose of phosphorus was applied through DAP as the basal application. Three irrigations were applied as per treatments. Source of irrigation was rain water harvested in farm pond. Total no of treatments were 12 which replicated four times. Plant geometry maintained in experiment was 30×10 cm.

Physiological characterstics of experimental field was Sandy loam soil with having pH 9.0 and EC (ds m^{-1}) 0.30 ds m^{-1}, percent organic carbon was 0.30 %, available nitrogen were 243 kg ha^{-1}, available P_2O_5 20.2 kg ha^{-1} and available potash was 247 kg ha^{-1}.

The statistical calculation were done by as per analysis of variance described by Gomez and Gomez 1984 to analysis the test of significance of treatments. Gomez, K. A. and Gomez A. A. 1984.

RESULT AND DISCUSSION

Number of Branches $plant^{-1}$ (80 DAS)

Results revealed that after 80 DAS in pooled analysis of both the years 2018-19 and 2019-20 in level of irrigation I_2 **(**at 25 & 50 DAS**)** 18.15 and I_3 (25, 50 & 75 DAS) 16.28 at par with each other which was significantly higher over Irrigation (One at 25 DAS) (I_1) 19.12. In terms of nitrogen level it was found that on the basis of pooled analysis application of nitrogen 60 kg N ha^{-1} (N_3) 18.8 and 80 kg N ha^{-1} (N_4) 20.07 both are at par with each other which was significantly higher over 20 kg N ha^{-1} (N_2) and 40 kg N ha^{-1} (N_1), same trend was found during both the years 2018-19 and 2019-20. With increase in no of irrigations and nitrogen levels increases growth and yield parameters. Moisture availability during crop growing periods increases the no of branches $plant^{-1}$ of crop. N Fertilization plays a major role in increasing growth parameters of the garden cress. In the month of October and November due to low temperature availability and mineralization of organically applied nitrogen reduced. With application of urea it increases the uptake of nitrogen in plants significantly results in increases no of branches $plant^{-1}$ and growth parameters. Similar results were found with Tuncay *et al*., 2011, Dewangan., 2015.

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Fresh weight at harvest (g plant^{-1})

Under three irrigation levels and different nitrogen levels highest fresh weight (g plant^{-1}) was found in I_3 (25, 50 & 75 DAS) 369.87 g which was at par with I_2 353.25 g plant^{-1} in the year 2018-19. Both the treatments were significantly found higher fresh weight over I_1 Irrigation (One at 25 DAS) 303.43 g plant^{-1}. Same trend was found in the year 2019-20 under irrigation levels. Mean analysis of two year data revealed that highest fresh weight g plant^{-1} was found under Three irrigation (25, 50 & 75 DAS) (I_3) 382.41 g plant^{-1} which was at par with two Irrigation (at 25 & 50 DAS) (I_2) and both treatments higher over Irrigation (One at 25 DAS) (I_1) 313.72 g plant^{-1}. In different nitrogen level applications highest fresh weigh (g plant^{-1}) was found under application of 80 kg N ha^{-1} (N_4) 375.66 g plant^{-1} which was at par with 60 kg N ha^{-1} (N_3) 366.91 g plant^{-1} in the year 2018-19. Same trend was found in the next year 2019-20. Mean data of both the years concluded that highest fresh weight (g plant$^{-1)}$ was found under Three irrigation (25, 50 & 75 DAS) (I_3) 382.41 g plant^{-1} which was at par with two irrigation (at 25 & 50 DAS) (I_2) 365.22 g plant^{-1} significantly higher over Irrigation (One at 25 DAS) (I_1) 313.72 g plant^{-1}. In application of 80 kg N ha^{-1} (N_4) was found highest fresh weight 388.40 g plant^{-1} which was at par with 60 kg N ha^{-1} (N_4) 379.35 g plant^{-1}.

Comment [A9]: in different nitrogen level applications highest fresh weight of 275.66g plant^{-1} was recorded with application of 80 kg N/ha which was at par application of 60 kg N ha^{-1} (366.91g/plant) in the year 2018-19. Similar trend was recorded for the next year2019-2020.

Fresh weight of plant depends on availability of moisture and nitrogen fertilization during crop growth period. Fertilization with urea basal application and after first irrigation availability of nitrogen to the crop was sufficient during crop growth period and irrigation was done time to time which results in higher fresh weight and growth parameters. Similar results were found in the study of Patnaik *et al*. (2016) and Kumari and Patel (2013).

Table 1: Effect of Irrigation and Nitrogen levels on No. of Branches plant^{-1} (80 DAS) & Fresh weight at harvest (g plant^{-1}) of Chandrasur (*Lepidium sativum*)

Comment [A10]: Mention if its pooled data over years

Treatments	Number of Branches plant^{-1} (80 DAS)			Fresh weight at harvest (g plant^{-1})		
Irrigation levels	**2018-19**	**2019-20**	**Pooled**	**2018-19**	**2019-20**	**Pooled**
Irrigation (One at 25 DAS) (I_1)	15.75	16.81	16.28	303.43	324.01	313.72
two Irrigation (at 25 & 50 DAS) (I_2)	17.56	18.75	18.15	353.25	377.20	365.22
Three irrigation (25, 50 & 75 DAS) (I_3)	18.5	19.75	19.12	369.87	394.95	382.41
SEm±	0.57	0.61	0.423	11.16	11.92	8.17
CD (P=0.05)	2.00	2.14	1.306	38.65	41.27	25.17

Nitrogen levels						
20kg N ha^{-1} (N_1)	15.25	16.28	15.76	302.58	323.09	312.84
40 kg N ha^{-1} (N_2)	16.16	17.26	16.71	323.58	345.52	334.55
60 kg N ha^{-1} (N_3)	18.25	19.48	18.86	366.91	391.79	379.35
80 kg N ha^{-1} (N_4)	19.41	20.73	20.07	375.66	401.13	388.40
SEm±	1.07	1.14	0.783	18.38	19.63	13.44
CD (P=0.05)	3.10	3.32	2.22	53.35	56.97	38.13

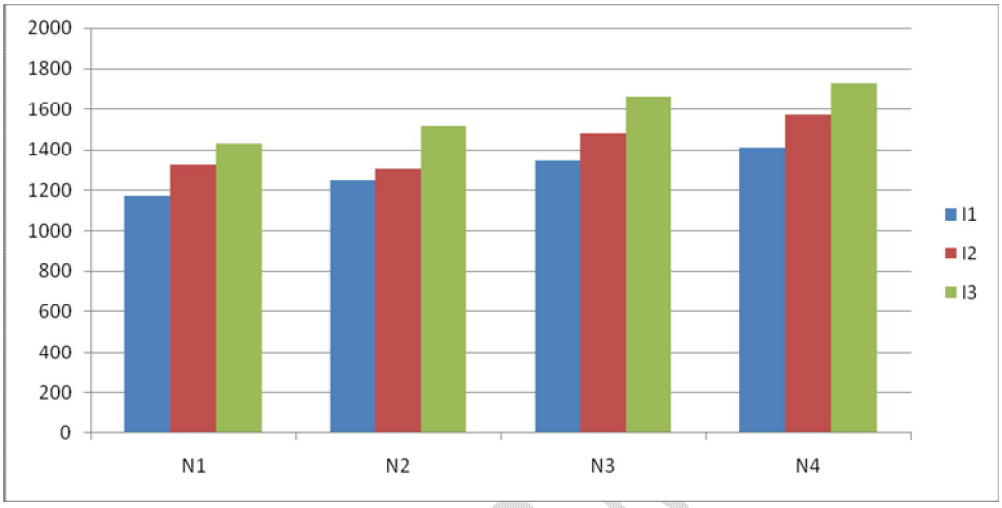
1000 seed weight (g)

In terms of 1000 seed weight (g) was found highest under Three irrigation (25, 50 & 75 DAS) (I_3) 1.61 g which was at par with two Irrigation (25 & 50 DAS) (I_2) 1.56 g in mean data of both the years. Similar trend was found in both the years. Under different nitrogen levels highest 1000 seed weight g was found under 80 kg N ha^{-1} (N_4) 1.67 g which was at par with 60 kg N ha^{-1} (N_3) 1.55 in pooled data of both the years. Same results and trend were found during both the respective years.

Seed Yield (Kg ha^{-1})

Highest Seed yield 1593 kg ha^{-1} was found under three irrigations (25, 50 & 75 DAS) (I_3) which was at par with two Irrigation (25 & 50 DAS) (I_2) and significantly higher over Irrigation (One at 25 DAS) (I_1). Under N fertilization treatments highest yield was found with application of 80 kg N ha^{-1} (N_4)1586 kg ha^{-1} which was at oar with 60 kg N ha^{-1} (N_3) and significantly higher over 40 kg N ha^{-1} (N_2) and 20 kg N ha^{-1} (N_1) in pooled data of both the years. Similar trend in yield data was found during both the years under irrigation and nitrogen levels.

Fig:1: Effect of Irrigation and Nitrogen levels on seed yield (Kg ha^{-1}) of Chandrasur (*Lepidium sativum*)



The significant increase in yield was found under the treatments when increases level of irrigations and dose of nitrogen but at some level 80 kg N ha^{-1} (N_4) and 60 kg N ha^{-1} (N_3) results found at par. Higher yield was a result of increase in morphological and physiological characters of plant. Available moisture during crop growth period can also enhances the nutrient uptake and oil content in green leafy crops and vegetables also which related to increasing in growth parameters and yield. Similar results was found in the study of Singh *et al.*, (2021), Inne *et al.*, (2021) and Choudhary et al., (2022).

Fertilization of nitrogen significantly increases the growth parameter of crops which is cumulatively increases yield of crop. Nitrogen is the main part of protein and nucleic acid which

Is the main nutrient used by the vegetables for their growth. It is main element of chlorophyll, alkanoids and enzymes also (Castellanos *et al.*, 2000). Many studies revealed that with increasing level of nitrogen crop growth increases upto a certain level. (Topçuoğlu and Yalçin, 1996, Mordoğan et al., 2001).

Table 2: Effect of Irrigation and Nitrogen levels on 1000 seed weight (g) & Seed yield (Kg ha^{-1}) of Chandrasur (*Lepidium Sativum*)

Treatments	**1000 seed weight (g)**			**Seed yield (Kg/ha)**		
Irrigation levels	**2018-19**	**2019-20**	**Pooled**	**2018-19**	**2019-20**	**Pooled**

Irrigation (One at 25 DAS) (I_1)	1.37	1.47	1.42	1247	1286	1266
two Irrigation (25 & 50 DAS) (I_2)	1.51	1.61	1.56	1408	1525	1466
Three irrigation (25, 50 & 75 DAS) (I_3)	1.56	1.66	1.61	1583	1602	1593
SEm±	0.05	0.05	0.03	52.41	44.25	48.33
CD (P=0.05)	0.16	0.17	0.10	181.38	153.13	167.32
Nitrogen levels						
20kg N ha^{-1} (N_1)	1.35	1.44	1.39	1287	1360.62	1323
40 kg N ha^{-1} (N_2)	1.46	1.55	1.50	1333	1410.44	1371
60 kg N ha^{-1} (N_3)	1.50	1.60	1.55	1471	1503.75	1487
80 kg N ha^{-1} (N_4)	1.61	1.72	1.67	1561	1611.02	1586
SEm±	0.04	0.04	0.03	44.24	40.46	41.67
CD (P=0.05)	0.12	0.13	0.08	128.37	117.43	121.56

Conclusion

From the present study it may be concluded that, integration of two irrigation (25 & 50 DAS) (I_2) with 60 kg N ha^{-1} gives higher yield of growth parameters and seed yield.

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Comment [A11]: Follow same pattern of writing a reference

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