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PERFORMANCE OF MUSTARD VARIETIES UNDER DIFFERENT IRRIGATION SCHEDULES

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ABSTRACT

A field experiment was conducted during *rabi* season of 2022-23 at the research farm of Agronomy section, College of agriculture, Nagpur to study the performance of mustard varieties under different irrigation schedules. This experiment was laid out in split plot design with four replications. Irrigation schedules comprised one irrigation at flowering stage, two irrigations at flowering and pod development stage and three irrigations at rosette, flowering and pod development stage and four varieties of mustard (ACN-9, TAM-108-1, BIO-902 and Kranti). The results showed that scheduling of three irrigations at rosette, flowering and pod development stage significantly increased plant height, number of branches plant^{-1}, leaf area plant^{-1}, dry matter accumulation plant^{-1}, number of siliquae plant^{-1}, test weight, seed yield plant^{-1}, seed yield ha^{-1} and stover yield ha^{-1}. In varieties, variety TAM-108-1 of mustard significantly recorded more growth and yield. However, variety of ACN-9 was at par with variety TAM-108-1. Scheduling of three irrigations at rosette, flowering and pod development stage with variety TAM-108-1 recorded highest seed yield plant^{-1} and ha^{-1} followed by scheduling of three irrigations with variety ACN-9.

(Key words: Varieties, schedules, irrigation, Indian mustard, yield)

INTRODUCTION

Oil seed crops are the very important component of tropical agriculture, as they provide easily available and highly nutritious human food and animal feeds. India has attained self sufficiency in cereals but still there is a deficiency in oilseed production. The availability of oil and fats in our country is only 15 kg person^{-1} annum^{-1} as per the ICAR recommendation (Anonymous, 2022). Therefore, to keep pace with increasing demand, there is urgent need to boost up the oilseed production. It is therefore necessary to find out the suitable irrigation schedules among different varieties of mustard.

Irrigation scheduling is one of the important crop management activities and influences the effective and efficient utilization of water by crops. Water is becoming an increasingly scarce resource for agriculture and good qualities water is limited (Raut *et al*, 2018). It simply implies when to irrigate the crop and how much water to apply. The objective of irrigation is to maintain the soil moisture optimum level in the plant zone, so that root will have a constant supply of moisture with adequate aeration. Varieties of the mustard crop decides its growth and yield potential under specific agro-climate along with efficient resource utilization. Efficient water management requires through study of plant water relationship, climate, agronomic practices and economic assessment (Maurya *et al.*, 2022).

MATERIALS AND METHODS

The experiment was laid out in split plot design with four replications in *rabi* 2022-23 at research farm of Agronomy section, College of Agriculture, Nagpur. All the recommended cultural practices were followed to raise a good crop. The observation on plant height (cm), number of branches, dry matter accumulation (g) were recorded at harvest. Leaf area plant $^{-1}$ was recorded at 90 DAS. Observations on number of siliquae plant^{-1}, test weight, seed yield plant^{-1}, seed yield ha^{-1} and stover yield ha^{-1} were also recorded.

RESULTS AND DISCUSSION

Effect of irrigation

Data revealed that irrigation schedules significantly influenced the growth attributes *viz*., plant height, number of branches plant^{-1}, leaf area plant^{-1} and dry matter accumulation plant^{-1}. Application of three irrigation schedules at rosette, flowering and pod development stage (I_3) recorded maximum values for all above growth characters

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which was significantly superior to scheduling of one irrigation at flowering stage (I_1) and two irrigations at flowering stage and pod development stage (I_2). Higher values of growth attributes in three irrigation treatment might be due to more available soil moisture for crop growth. These results are in conformity with the findings of Mishra *et al*. (2018), who reported that application of three irrigations at 35 DAS, 60 DAS and 90 DAS recorded significantly increased plant height, leaf area plant^{-1} and dry matter accumulation. Higher values of yield and yield characters i.e. number of siliquae plant^{-1}, test weight, seed yield plant^{-1}, seed yield ha^{-1} and stover yield ha^{-1} were recorded under scheduling of three irrigations at rosette, flowering and pod development stage (I_3) which was significantly superior to scheduling of one irrigation at flowering stage (I_1) and scheduling of two irrigations at flowering stage and pod development stage (I_2). This might be due to maintence of favorable soil moisture in the crop root zone which reflected in higher values of yield contributing characters. The results are in close conformity with Nagdive *et al*. (2007), who reported that application of three irrigations at branching, flowering and siliquae development stage recorded maximum values of number of siliquae plant^{-1}, test weight, seed yield plant^{-1}, seed yield ha^{-1} and stover yield ha^{-1} which were significantly superior to one and two irrigations.

Effect of varieties

Data revealed that different mustard varieties had significant effect on growth attributes *viz*., plant height, number of branches plant^{-1}, leaf area plant^{-1} and dry matter accumulation plant^{-1}. Variety TAM-108-1 recorded higher values of all above characters than other varieties. Variation in growth attributes might be due to their genetic variability, varietal differences and environmental adaptability or might be traced to the significant increase in morphological parameters which are responsible for the photosynthetic capacity of the plant thereby increasing the biological yield. Similar results were also reported by Mankar *et al*. (2013). They reported that dry matter accumulation of variety Kranti was lowest over varieties ACN-9 and BIO-902. Yield and yield attributing characters *viz*., number of siliquae plant^{-1}, test weight, seed yield plant^{-1}, seed yield ha^{-1} and stover yield ha^{-1} were significantly increased with variety TAM-108-1 than other varieties. However, variety ACN-9 was at par with TAM-108-1. Environmental factors, such as soil quality, climate and sunlight, also play a role in shaping these differences. Nair *et al*. (2020) reported that the variety TAM-108-1 recorded significantly higher seed yield plant^{-1} and seed yield ha^{-1}. Gopale *et al*. (2022) also reported that variety TAM-108-1 recorded maximum test weight over varieties T-9, ACN-255, SKM-1626 and ACN-255.

Interaction effect

Data revealed that interaction effect due to irrigation schedules and varieties of mustard were found to be non-significant in respect of all the growth and yield contributing characters. However, seed yield plant^{-1} and seed yield ha^{-1} were found to be significant. From the result it is inferred that scheduling of three irrigations at rosette, flowering and pod development stage with variety TAM-108-1 found to be best for highest seed and stover yield.

Table 1. Growth contributing characters of mustard influenced by various treatments

Treatments	Plant height (cm) at harvest	No. of branches plant^{-1} at harvest	Leaf area plant^{-1} (dm^2) at 90 DAS	Dry Matter accumulation plant^{-1} at harvest (g)
Irrigations schedules				
I_1-One irrigation	129.61	3.25	2.34	37.36
I_2-Two irrigation	140.67	4.64	3.50	44.06
I_3-Three irrigation	145.73	4.87	4.16	51.05
SE(m)±	0.70	0.05	0.12	1.54
CDat 5 %	2.12	0.14	0.36	4.58
Varieties				
V_1-ACN-9	140.06	4.30	3.44	47.36
V_2-TAM-108-1	141.61	4.41	3.65	48.80
V_3-Bio-902	135.50	4.15	3.14	41.42
V_4-Kranti	137.50	4.18	3.10	39.06
SE(m)±	1.22	0.06	0.15	0.92
CDat 5 %	3.56	0.17	0.46	2.72
Interaction				
SE(m)±	2.12	0.10	0.26	1.60
CDat 5 % -	-	-	-	

Table 2. Yield contributing characters and yield of mustard influenced by various treatments

Treatments	No. of siliquae plant^{-1}	Test weight (g) at harvest	Seed yield plant^{-1} (g)	Seed yield (q ha^{-1})	Stover yield (q ha^{-1})
Irrigations schedules					
I_1-One irrigation	117.50	2.47	2.64	5.04	15.63
I_2-Two irrigation	142.00	3.11	3.49	7.59	19.41
I_3-Three irrigation	222.06	3.52	5.03	8.34	21.26
SE(m)±	4.03	0.08	0.38	0.13	0.41
CDat 5 %	12.10	0.23	1.12	0.39	1.25
Varieties					
V_1-ACN-9	163	3.16	4.44	7.33	18.79
V_2-TAM-108-1	168.33	3.19	4.56	7.60	19.96
V_3-Bio-902	156.16	2.87	2.93	6.57	18.35
V_4-Kranti	154.58	2.90	2.95	6.46	17.98
SE(m)±	3.41	0.07	0.26	0.12	0.42
CDat 5 %	10.22	0.21	0.77	0.35	1.24
Interaction					
SE(m)±	5.90	0.12	0.46	0.21	0.72
CDat 5 %	-	-	1.36	0.62	-

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