Original Research Article

Assessment of Irrigation Scheduling andNipping Management for Higher Yield and Economic Returns of Mustard

Comment [WU1]: In what agro ecological condition????

ABSTRACT

On-farm testing was conducted for two consecutive years during Rabi seasons 2018-19 and 2019-20 at farmer's fields of Majhgawan block of Satna district to validate the effect of irrigation scheduling and nipping management for higher yield and economic returns of mustard. The on-farm testing trials were laid out with two treatments i.e T_1 Two irrigation (25 DAS and 40-45 DAS) and no nipping and T_2 Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS). Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS) recorded highest primary branches (13.95) and secondary branches (27.85)per plant,siliquae/plant (189.15), seeds/siliqua (19.30) seed yield (23.59 q/ha),gross returns (Rs 101721/ha), net return (Rs 71746/ha) and B:C ratio (3.39) as compared to application of two irrigation (25 DAS and 40-45 DAS) and no nipping.Two irrigations at pre-flowering and pod filling with nipping at pre bud stage (30 DAS) increase in plant growth and yield parameters so it can be recommended for getting higher yield of Mustard over non-nipping.

Comment [WU2]: Name of country ???

Comment [WU3]: Concluding remarks??

Comment [WU4]: Recommendation???

Keyword: Irrigation scheduling, Nipping management, Yield, Net Monetary Return, B:C Ratio

INTRODUCTION

Comment [WU5]: Back ground of research

Comment [WU6]: Research gap found in previews research???

Indian mustard (Brassica juncea L.)is the principal oilseed crop of Madhya Pradesh. It occupied an area of 6.23 million hectares and produced 9.34 million tonnes annually with an average productivity of 1499 kg/ha of country. In Madhya Pradesh, rapeseed and mustard is grown in 0.78million hectares area with an annual production of 1.11 million tones and average productivity of 1422 kg/ha (Anonymous,2019).Physiological manipulations may influence the plant source to sink relationship and ultimately yield.

There is a need to explore the advantage of simple agro techniques like nipping, which suppresses the apical dominance and facilitates more lateral branches, ultimately resulting in more siliqua/plant and yield(Choudhary *et al.* 2018). Timely scheduling of irrigation increases the availability of water and nutrients by creating a favorable soil moisture regime and nipping of mustard increases the number of branches and thus increases the productivity of Mustard by 25 %. There are reports on the advantage of nipping in soybean, castor, chickpea and sunflower, however, so far not much research work has been done in Indian mustard. Therefore, on-farm testing was undertaken to find out the profitability of irrigation scheduling and nipping management in Mustard. Nipping in mustard is one of the important parameters for the enhancement of the yield and yield contributing parameters.

Comment [WU7]: Objective of this rearch???

Comment [WU8]: Significance of study ???

MATERIALS AND METHODS

The study was undertaken in the farmer's fields of Satna district as On-farm testing programme by Krishi Vigyan Kendra Satna during two consecutive years Rabi 2018-19 and 2019-20.

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Problem diagnosis: Low productivity and profitability of rice/blackgram-mustard cropping system

Selection of farmers: Krishi Vigyan Kendra has arranged the meeting with the help of department of agriculture, Satna for farmers who's got lower yield from rice/blackgram-mustard cropping system during the previous year 2017-18. They were made aware on irrigation scheduling and nipping management and general practices for higher yield of mustard. From this group, 10 farmers were selected for the On-farm assessment of irrigation scheduling and nipping management for higher yield and economic returns in mustard. In addition to the training, they were given details of laying out of experiment, practices to be fallowed and how to take observation as a printed instruction sheet.

About experimental site: Geographically Satna is situated in the Satpura and Kaymore Plateau range and lies at 24^0 51' 15" to 24^0 57' 30" N latitude and 80^0 43' 30" to 80^0 54' 15" E longitude at the elevation of 313 m from the mean sea level.The location has a subtropical climate characterized by hot dry summer and cool winter. The soil of the farmer's fields was sandy loam

in texture with shallow in depth and soil was very low in available nitrogen, low in available phosphorus and higher in available potassium. Soil reaction was almost neutral.

Treatments: The on-farm testing trials were laid out with two treatments i.e T_1 Two irrigation (25 DAS and 40-45 DAS)and no nipping, T_2 Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS)on 10 farmers' fields considering each field as separate replication.

Imposition of treatment: Nipping was done by plucking the apical bud at 30 DAS with the help of a sharp blade.

Fig.1. Nipping in mustard at pre bud stage (30 DAS)

Package of practices followed: Mustard variety 'Giriraj' was sown during the first week of November during the year 2018-19 and 2019-20 and sowing was done after harvesting of paddy followed by pre-sowing irrigation and 3-4 cultivation after getting workable field condition. The Mustard crop was sown in spacing, 45×12 cm and drilling of seed (5 kg/ha) by seed cum ferti drill with the full dose of Single Supper phosphate (250 kg/ha), and mureate of potash (50 kg/ha) and half dose of urea (87 kg/ha) was applied at a time of sowing and the remaining dose of nitrogen was applied remaining half dose of urea (87 kg/ha through top dressing after first irrigation at the appropriate moisture level in fields.

Observations record: Five plants from the sampling rows were uprooted and used to compute the biometric and yield observations.

Analysis: In economic analysis, the cost of cultivation was worked out taking into account the prevailing labour and field operation charges in the locality, cost of inputs and the extra

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treatment costs in /ha The gross return was calculated on the local market prices of Mustard and expressed on per hectare basis.

Gross monetary returns (GMR): Based on the prices of output prevailing at the time of harvest, treatment-wise GMR (INR ha^{-1}) was computed.

Net monetary returns (NMR): Based on the current market price of inputs and outputs, the NMR (INR ha-1) was worked out by using the following formula.

$$\text{Net monetary returns } \left(\text{INR ha}^{-1}\right)=\left[\text{Gross monetary returns } \left(\text{INRha}^{-1}\right)\right]-\left[\text{Total cost of cultivation } \left(\text{INR ha}^{-1}\right)\right]$$

Benefit: cost ratio: It was calculated by using the formulae given below:

$$\text{Benefit: cost ratio}=\frac{\text{Gross monetary returns } \left(\text{INR ha}^{-1}\right)}{\text{Total cost of cultivation}\left(\text{INR ha}^{-1}\right)}$$

RESULTS AND DISCUSSION

Growth parameters

The data (Table 1) showed that the T_2Application of two irrigation (35-40 and 65-75 DAS) with nipping at pre bud stage (30 DAS) recorded lower plant height (191.40 cm)and higher primary branches (13.95) and secondary branches (27.85) per plant of mustard inover T_1-Two irrigation (25 DAS and 40-45 DAS) and no nipping. Arjun Sharma et al., (2003) noticed the reduction in plant height and increase in the number of primary and secondary branches. Apical bud nipping is known to alter the source-sink relationship by arresting the vegetative growth and hastening the reproductive phase. It also helps in the production of more siliquae bearing branches thus, resulting in increased photosynthetic metabolic activity, accumulation of more photosynthates and metabolites, ultimately resulting in a better quality seed with higher seed yield. Similar results were also obtained by Thakral et al., 1991.

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Table 1. Growth parameters influenced by irrigation scheduling and nipping management of mustard (average of two years)

Treatments	Plant height (cm)	Primary branches/plant	Secondary branches/plant
T_1 Two irrigation (25 DAS and 40-45 DAS)and No nipping	196.65	10.25	26.35
T_2 Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS)	191.40	13.95	27.85

Yield attributes and Yield:

The data (Table 2) revealed that the T_2-Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) with nipping at pre bud stage (30 DAS) recorded highest siliquae/plant (189.15), Seeds/siliqua (19.30) and Seed yield (23.59 q/ha) as compared to T_1-Two irrigation (25 DAS and 40-45 DAS) and no nipping. An increase in the seed yield by nipping might be due to an increase in the number of productive branches, leaf thickness, number of siliquae per plant and number of seeds per siliqua. Similarly, an increase in yield due to nipping was also observed by Reddy (1997) and similar results were also obtained by Himayatullah et al., (1989) and Aurangzeb et al., (1996) respectively.

Table 2. Yield attributes and yield as influenced by irrigation scheduling and nipping management in mustard (average of two years)

Treatments	Siliquae/plant (no)	Seeds/Siliqua (no)	Test weight (g)	Seed Yield (q/ha)
T_1 Two irrigation (25 DAS and 40-45 DAS)and No nipping	162.65	18.20	5.85	18.63
T_2 Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS)	189.15	19.30	6.10	23.59

Economics of the treatments:

Data regarding economics of the treatments depicted in Table 3 indicated that the application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days)

with nipping at pre bud stage (30 DAS) recorded highest gross returns (Rs 101721/ha), net return (Rs 71746/ha) and B: C ratio (3.39) as compared to application of two irrigation (25 DAS and 40-45 DAS) and no nipping

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Table 3. Economics influenced by irrigation scheduling and nipping management of mustard (average of two years)

Treatments	Cost of cultivation (Rs/ha)	Gross Monetary Returns (Rs/ha)	Net Monetary Return (Rs/ha)	B: C ratio
T_1 Two irrigation (25 DAS and 40-45 DAS)and No nipping	28855	80357	51502	2.78
T_2 Application of two irrigation (one each at pre-flowering 35-40 days and pod filling 65-75 days) and nipping at pre bud stage (30 DAS)	29975	101721	71746	3.39

CONCLUSION

Based on these findings, two irrigations at pre-flowering and pod filling with nipping at pre bud stage (30 DAS) increase in plant growth and yield parameters so it can be recommended for getting higher yield of Mustard over Two irrigation (25 DAS and 40-45 DAS) and no nipping

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