Original Research Article

EFFECT OF VARIOUS PRESOWING SEED TREATMENTS ON GROWTH AND YIELD PARAMETERS OF YELLOW MUSTARD (*Sinapis alba*) Variety (ISP -186)

ABSTRACT

The present investigation was conducted during *Rabi* season in the year (2021-2022) at post graduate Central Research Farm, Department of Genetics and plant Breeding , Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology And Sciences, PRAYAGRAJ-211007 (U.P) with a goal to evaluate the **EFFECT OF VARIOUS PRESOWING SEED TREATMENTS ON GROWTH AND YIELD PARAMETERS OF YELLOW MUSTARD (*Sinapis alba*) Variety (ISP -186)** and to find out suitable seed priming method for mustard under Randomized Block Design with 13 priming treatments which are replicated thrice. The results revealed that treatment T_3 rhizobium (10%) has recorded maximum Field emergence(97.17), plant height (90.26cm) ,Number of Branches (15.07),Days to 50% flowering(71) , Days to Mturity(117), Number of siliqua\plant (289.33), Number of seeds\siliqua (16.40), seed yield /plant (7.35),seed yield \plot(28.7), Biological yield (131.54),Harvest index (17.94).significance mean sum of squares due to seed priming treatments were observed for all the characters under study viz., Field emergence percentage, Plant height (30, 60, 90, 120 DAS and at harvest), Number of branches/plant, Days to maturity, Number of silique/plant, Number of seeds/plant, seed yield/plant (gm), Seed yield/plot (gm), Biological yield (gm), Harvest index (%) which were highly significant at 1% level of significance indicating presence of good amount of variability among the treatments for these characters.

Key words: Rhizobium, Vermiwash, Neem leaf extract, Tulasi leaf extract.

INTRODUCTION:

Yellow mustard is an important oilseed crop belonging to family cruciferous (Brassicacae). Yellow mustard is natural amphidiploids having chromosome no (2n=36). It is self-pollinated but certain amount (2-15 %) pollination occur due to insects and other factors. In india mustard occupy 6.23 million,ha area with production and productivity of 9.34 million tonnes and 1499kg ha respectively (2019-20). It is a major rabi crop.cultivation of mustard is taken up between October – November and February-march.major growing areas are rajasthan, uttar Pradesh,and Haryana . Broadly seven varieties of mustard are mostly grown in india.rajasthan and uttar Pradesh are major mustard producing states in india.Yellow Mustard has a yellow seed coat and is primarily grown for the North American condiment industry, where it is used to produce traditional yellow mustard condiment, mayonnaise and certain salad dressings. The seed of yellow mustard also contains a water-binding mucilage that has been used as a binding agent and protein extender in prepared meats. Edible oils are the concentrated sources of energy, contain essential fatty acids (linoleic and linolenic), carriers of fat soluble vitamins (A, D, E and K) and contribute to taste, flavour, palatability and satiety of food (Khobragade *et al* 2008).

Rhizobium starvation is common in micronutrient deficient soils. Seeds treated with Rhizobium shows maximum germinability and vigour index. Now a days seeds treated with Biofertilizers shows best results producing high yield and enhance plant growth (Maurya *et al*.2021). It also acts as a plant growth promoter by mechanisms of tolerance of abiotic stresses. Vermiwash is a liquid extract produced from vermicompost in a medium where earthworms are richly populated. It comprises a massive decomposer bacteria count, mucus, vitamins, different bioavailable minerals, hormones, enzymes, different antimicrobial peptides, etc. Seeds primed with Vermiwash results in highest field emergence and better yield in various field crops (Manjunadh *et al*. 2021). It acts as a plant growth promoter. Many studies have reflected the great potential of vermicompost and Vermiwash in agricultural and horticultural practices. The use of botanicals which are easily available cost effective and non-hazardous, is highly preferred in the recent times for the effective management of seed borne diseases and improvement of seed Neem leaf extract was prepared according to the method of (Agbenin & Marley [2006]. Fresh neem leaves were weighed, sterilized and were washed with distilled water. Leaves were ground in Motor and mixed with distilled water. Seeds treated with neem leaf extract are apparently healthy. It exhibits most of insecticidal properties and can be used as a pesticide, fungicide and weedicide. Neem leaf can also be used as a biofertilizer as they are capable of increasing the yield of the vermicompost. Seeds treated with neem extract increases seed germination and seedling emergence with increased shoot and root length. It enhances seed vigour and also inhibits fungal growth (Sheeba et al. 2018). Tulsi leaves are dried under room temperature and those dried leaves were powdered and preserved in glass bottles. The prepared powder is mixed with distilled water and can be used as a seed primer. Oilseeds treated with Tulsi extract showed substantial inhibition of the fungal growth and improved percentage of germination. Oil seeds also exhibited improved vigour index on treatment with Tulsi leaf extract. Seeds treated with this can show highest germination percentage when compared to untreated seeds. It reduces the attack of seed borne diseases and increase the quality of seed. (Sheeba *et al*. 2018).

MATERIALS AND METHODS:

The present research on **EFFECT OF PRESOWING SEED TREATMENTON GROWTH AND YIELD PARAMETERS OF YELLOW MUSTARD (*Sinapis alba)* Variety (ISP -186)** was made to identify the effect of seed priming of different kinds on seed quality parameters of mustard and to find out suitable seed priming method for mustard. For this purpose, 13 priming treatments including control on yellow mustard seed variety ISP-186 were used to study under filed conditions during Rabi, 2021-22. The treatments were T0–Control, T1-Rhizobium (5%), T2- Rhizobium (8%), T3- Rhizobium (10%), T4-Vermiwash (5%), T5- Vermiwash (8%), T6- Vermiwash (10%), T7-Neem leaf extract (5%), T8-Neem leaf extract (10%), T9-Neem leaf extract (15%), T10-Tulasi leaf extract-(5%), T11-Tulasi leaf extract-(10%), T12-Tulasi leaf extract-(15%). The mustard seeds were primed with above different priming agents in above different concentrations and intensities for a given duration. After priming seeds were dried to initial moisture content at room temperature. After that the primed seeds were used to grow under field conditions. Field experiment was laid out in Randomized BlockDesign (RBD) with three replications during Rabi 2021-22. Data were recorded for 10 characters i.e.

Pre-harvest characters viz., Field emergence percentage, Plant height (30, 60, 90, 120, at harvest), number of branches (30, 60, 90, 120, at harvest), 50% of flowering and Days to maturity.

Post–harvest characters viz., number of silique/plant, number of seeds/silique, seed yield/plant (gm), seed yield/plot (gm), biological yield (gm), harvest index (%). Analysis of variance (Table-1) for the data revealed that significance mean sum of squares due to seed priming treatments were observed for all the characters under study viz., Field emergence percentage, Plant height (20, 40, 60, 80, at harvest), number of branches (20, 40, 60, 80, at harvest), 50% of flowering and Days to maturity, number of silique/plant, number of seeds/silique, seed yield/plant (gm), seed yield/plot (gm), biological yield (gm), harvest index (%). which were highly significant at 1% level of significance indicating presence of good amount of variability among the treatments for these characters.

RESULTS AND DISCUSSION:

GROWTH ATTRIBUTES:

Seed priming is a technique to reduce emergence time, accomplish uniform emergence time, better algometric (changes in growth of plant parts over time) attributes and provide requisite stand in many horticultural and field crops. Various pre-hydration or priming treatments have been employed to increase the speed and synchrony of seed germination. The treatments showed significant effect of pre-sowing seed treatment on field emergence. The mean performance of field emergence ranged from 84.67 % to 93.33 % with the mean value of 88.10 %. The minimum field emergence was exhibited by treatment T0 [control](84.67 %), while maximum field emergence was recorded in treatment T2 - Rhizobium – 8 % (93.33) followed by T3 - Rhizobium 10% (92.33) and T1 – Rhizobium 5% (90.67) were significantly higher than other significant treatments. plant heightat 60 DAS. The mean performance of plant height at 60 DAS ranged from 84.32 cm to 90.26 cm with the mean value of 87.34 cm. The minimum plant height was exhibited by treatment T0 - control (84.32 cm), while maximum plant height was recorded for treatment T3- Rhizobium - 10% (90.26 cm) followed by T2 - Rhizobium 8% (90.00 cm), T1 - Rhizobium 5% (89.12 cm), T4 - Vermiwash 5% (85.00 cm), T7 - Neem leaf extract 5% (88.00 cm), T8 - Neem leaf extract 10% (88.49 cm), T9 - Neem leaf extract 15% (89.00 cm), T10 – Tulasi leaf extract 5% (86.29 cm), T11 - Tulasi leaf extract 10% (87.00), T12 - Tulasi leaf extract 15% (87.16 cm), were at par to each other. The treatments showed significant effect of pre-sowing seed treatment on number of branchesat 60 DAS. The mean performance of number of branches at 60 DAS ranged from 10.00 to 15.07 with the mean value of 12.80. The minimum plant height was exhibited by treatment T0 - control (10.00), while maximum plant height was recorded for treatment T3- Rhizobium - 10% (15.07) followed by T2 - Rhizobium - 8% (14.80) and T1 – Rhizobium – 5% (14.33) were at par to each other. The minimum 50% flowering was exhibited by treatment T3 - Rhizobium (62.33), while maximum 50% flowering was recorded for treatment T0 - control (71.00) followed by T4 - Vermiwash 5% (70.00), T5 – Vermiwash 8% (69.17), T6 – Vermiwash 10% (69.00), T10 - Tulasi leaf extract 5% (68.47), T11 - Tulasi leaf extract 10% (68.23) was at par to each other (CD 5%=3.07). The use of botanical extracts recorded less days to produce 50% flowers when compared to control. Janardhan (2014) also noted that treatment with botanical extract including neem leaf extract taken 2-3 days less from control to flowering. The minimum Days to maturity was exhibited by treatment T3 – Rhizobium 10% (110), while maximum Days to maturity was recorded for treatment T0 - control (117) followed by T4 – Vermiwash 5% (117) was significantly higher in comparison to other treatments.

Table 1: Mean performance of different treatments for pre harvest characters in yellow mustard (*Sinapis alba*) CV. ISP-186

Treatment Symbols	Treatments	Emergence (%)	PH DAS	No.of branches	50% flowering	Days to maturity
T_0	Control	87.00	84.32	10.00	71.00	117
T1	Rhizobium (5%)	95.46	89.12	14.33	64.00	111
T2	Rhizobium (8%)	96.52	90.00	14.80	63.22	110
T3	Rhizobium (10%)	97.17	90.26	15.07	62.33	110
T4	Vermiwash (5%)	88.42	85.00	11.00	70.00	117
T5	Vermiwash (8%)	91.33	85.00	11.67	69.17	116
T6	Vermiwash (10%)	91.67	85.78	11.80	69.00	115
T7	Neem leaf extract (5%)	94.21	88.00	12.93	66.00	113
T8	Neem leaf extract (10%)	94.56	88.49	13.60	65.00	112
T9	Neem leaf extract (15%)	94.82	89.00	13.73	64.75	112
T10	Tulasi leaf extracts (5%)	91.67	86.29	12.40	68.47	115
T11	Tulasi leaf extracts (10%)	92.00	87.00	12.53	68.23	114
T12	Tulasi leaf extracts (15%)	93.47	87.16	12.53	67.00	113
	C.V.	2.1907	1.6913	2.46	2.72	0.15
	S.E.	1.1756	52.37	0.18	1.05	0.10
	C.D. 5%	3.43	2.48	0.53	3.07	0.28
	C.D. 1%	4.64	3.37	0.72	4.16	0.38

Table 2: Mean performance of different treatments for postharvest characters in yellow mustard (*Sinapis alba)* CV. ISP-186

Treatment symbols	Treatments	No. of silique/plant	No. of seeds/silique	Seed yield/plant (gm)	Seed yield/plot (gm)	Biological yield (gm)	Harvest index (%)
T0	Control	228.60	13.33	5.45	24.7	122	16.83
T1	Rhizobium (5%)	288.07	15.40	7.29	28.1	130.67	17.72
T2	Rhizobium (8%)	289.20	15.67	7.31	28.7	131	17.95
T3	Rhizobium (10%)	289.33	16.40	7.35	28.8	131.54	17.94
T4	Vermiwash (5%)	265.93	13.53	5.49	25.3	123.61	16.99
T5	Vermiwash (8%)	268.73	13.60	5.69	25.9	124.11	17.26
T6	Vermiwash (10%)	270.73	13.87	5.85	26.0	124.34	17.29
T7	Neem leaf extract (5%)	281.93	14.87	6.67	27.2	126.37	17.71
T8	Neem leaf extract (10%)	284.73	15.27	6.87	27.5	127	17.82
T9	Neem leaf extract (15%)	286.33	15.33	7.05	27.7	127.46	17.88
T10	Tulasi leaf extracts (5%)	272.73	14.00	6.05	26.4	125	17.43
T11	Tulasi leaf extracts (10%)	275.33	14.60	6.25	26.6	125.27	17.54
T12	Tulasi leaf extracts (15%)	276.13	14.73	6.45	26.9	126	17.58
	C.V.	6.45	2.17	2.76	2.72	2.39	3.24
	S.E.	10.24	0.18	0.10	0.42	1.75	0.33
	C.D. 5%	29.90	0.54	0.30	1.23	5.10	0.96
	C.D. 1%	40.52	0.73	0.41	1.67	6.92	1.30

YIELD ATTRIBUTES:

The mean performance of number of silique/plant ranged from 228.60 to 289.33 with a grand mean of 275.21. Among the significant treatments, T3 – Rhizobium 10% (289.33) and T2 - Rhizobium 8% (289.20) and T1 – Rhizobium 5% (288.07), T4 – Vermiwash 5% (265.93), T5 – Vermiwash 8% (268.73), T6 – Vermiwash 10% (270.73) T7 – Neem leaf extract 5% (281.93), T8 – Neem leaf extract 10% (284.73), T9 – Neem leaf extract 15% (286.33), T10- Tulasi leaf extract 5% (272.73), T11 - Tulasi leaf extract 10% (275.33), T12- Tulasi leaf extract 15% (276.13) were significantly higher than other significant treatments. Number of seeds/silique were significantly higher in treatments, T3 – Rhizobium 10% (16.40) and T2 - Rhizobium 8% (15.67). In treatments T3 – Rhizobium 10% (7.35) and T2 - Rhizobium 8% (7.31), T1 – Rhizobium 5% (7.29) and T9 – Neem leaf extract 15% (7.05) were significantly higher than other significant treatments in seed yield/plot. The effect of pre-sowing seed priming on seed yield per plant was found to be significant and similar results of seed yield per plant was observed by Somasundaran et al., The mean performance of number of seed yield/plot ranged from 24.7 to 28.8 with a grand mean of 26.9. Among the significant treatments, T3 – Rhizobium 10% (28.8) and T2 - Rhizobium 8% (28.7), T1 – Rhizobium 5% (28.1) and T9 – Neem leaf extract 15% (27.7) were significantly higher than other significant treatments. The mean performance of biological yield ranged from 122 to 131.54 with a grand mean of 126.49. Among the significant treatments, T1- Rhizobium 5% (130.67), T2- Rhizobium 8% (131), T3 – Rhizobium 10% (131.54), T8- Neem leaf extract 10% (127), T9- Neem leaf extract 15% (127.46), were significantly higher than other significant treatments. The mean performance of harvest index ranged from 16.83 to 17.95 with a grand mean of 17.53. Among the significant treatments, T1- Rhizobium 5%, T2- Rhizobium 8%, T4 - Vermiwash (5%), T5- Vermiwash (8%), T6- Vermiwash (10%), T7- Neem leaf extract (5%), T8- Neem leaf extract (10%), T9- Neem leaf extract (15%), T10 - Tulasi leaf extract (5%), T11- Tulasi leaf extract (10%), T12- Tulasi leaf extract (15%). Where significantly higher with T3 – Rhizobium 10%.

CONCLUSION:

It is concluded from the present study that the seeds of yellow mustard (Variety- ISP 186) were treated with Rhizobium – 10% (T3) showed significant increase in growth, yield and yield attributing traits followed by Rhizobium – 8% (T2) as compared to control (untreated) seeds. These recommendations are based on six months experimentation and therefore further investigation is needed to arrive at valid recommendation.

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