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Full length Research paper

Effect of organic, Inorganic seed priming method treatments on plant growth and yield in yellow Mustard (Brassica juncea L. Czern & coss)

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The experiment was conducted in post graduate Seed Testing Laboratory and field, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) during *Rabi* season 2019-2020, in order to standardize the suitable pre-sowing seed treatment of Yellow mustard(T-151).Different pre-sowing seed treatments with T_0-Unprimed (Control), T_1-KNO_3 (3%), T_2- KNO_3 (5%), T_3- Polyethylene Glycol (PEG6000) @ 5%, T_4- Polyethylene Glycol (PEG6000) @ 10%, T_5– Moringa leaf Extract @ 5%, T_6– Moringa leaf Extract @ 10%, T_7– Pungam leaf Extract @ 5%, T_8– Pungam leaf Extract @ 10%, T_9- Trichoderma viride @ 1%, T_{10}- Trichoderma viride @ 3%, T_{11}- Azosperilium @ 1% and T_{12}- Azosperilium @ 3%.It was found that all Pre-sowing seed treatment with Azosperilium (3%) followed by KNO_3 (5%), Trichoderma Viride (3%), PEG_{6000} (10%) and Pungam leaf extract (5%), significantly increased the germination percentage and plant growth of yellow mustard comparison to control. Pre-sowing seed treatment with Trichoderma Viride and Azosperilium showed maximum increase in germinability, vigour of yellow mustard seeds and found to be lowest in control seeds. Pre-sowing seed treatments of the mustard seeds for 8 hrs, in which Trichoderma Viride give best result to enhanced germinability, seed vigour and yielding.

Key words: Yellow mustard seeds, KNO_3, PEG6000, Moringa leaf extract, Pungam leaf extract, Trichoderma and Azosperilium,

INTRODUCTION

Oilseeds form the second largest agricultural commodity after cereal in India, sowing nearly 14% of the country's grossed cropped area and accounting for nearly 5% of the gross national product and 10% of the agricultural products. The production which was around 2.68 million tones with a productivity level of 650 kg ha'[1] until 99 kg ha'[1](Indian Economic Survey, 2002-2003). Rapeseed-mustard is the major source of income especially even to the marginal and small farmers in rainfed areas. Among the oilseed crops, rapeseed mustard ranked next to ground nut (*Arachis hypogaea* L.) and soybean (*Glysine max* L.) in contribution to the oilseed production. They are being cultivated in 26 states in the northern and eastern plains of the country occupying about 6.75 million ha area during 2004-05. Nearly 34% area is rainfed under these crops (Kumar and Chauhan, 2005).

Among various oilseed crops grown in India, rapeseed-mustard group of crops (*Brassica spp*., Family *Brassicaceae*) comprising Indian rape (toria), Indian mustard (raya), oilseed rape (gobhisarson), Ethopian mustard (African sarson), yellow sarson, brown sarson and taramira, are next to soybean in terms of area and production. Cultivation of these crops in 28 states of the country under diverse agro-ecological situations over an area of 6.51 million hectares to produce 8.18 million tones signifies its importance in vegetable oil scenario of the country (Anonymous 2012).

Mustard [*Brassica juncea*L. (Czern & coss)] a member of *Brassicaceae* family and an important oil seed crop of the world. Brassica juncea (2n=36) is an amphi diploid species derived from inter specific cross between Brassica nigra (2n=18) and B. rapa (2n=20). Brassica juncea is a kind of cruciferae brassica annual

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herbaceous plant, which originated from spontaneous hybridization of the ancestors of B. rapa (AA, n=10) and B. nigra (BB, n=8) (Wang *et al.,* 2006). Mustard is an important Rabi season oilseed crop. Mustard seed is the world's second leading source of vegetable oil, after soybean. It is also the second most leading source of protein meal in the world after soybean. Population of India is increasing rapidly and consequently edible oil demand is also going up day by day. It is mainly grown in northern part of India, Rajasthan is the largest producing state followed by Uttar Pradesh (Sodani *et al.,* 2017).

Brassica oilseed crops, Brassica juncea, B. napus and B. rapa, cover more than 11 million hectares of the world's 6 agricultural land and provide over 8% of the major oil when grown under a variety of climatic conditions (FAO, 2003).India account for 21.7% and 10.7% of the total acreage and production. In India Rapeseed and mustard is grown in an area of 5.76 M ha with production and productivity of 6.8 MT and 1184 Kg/ha, respectively. Indian mustard (Brassica juncea L.) is predominantly cultivated in Rajasthan, Uttar Pradesh, Haryana, Madhya Pradesh and Gujarat. Uttar Pradesh accounts for 10.85% and 11.19% of area and production, respectively in the country with the average yield of 11.49 q/ha which is equivalent to the national average (11.17q/ha) (Anonymous, 2016).

Soybean, groundnut and rapeseed-mustard are the major oilseed crops in India contributing nearly 79% and 88% to its total acreage and production, respectively. The contribution of rapeseed-mustard to the total oilseed acreage and production is 23.7% and 26.0%, respectively. During 2009-10 rapeseed-mustard contributing 25.9% and 22.0% to 2 the total oilseed production and acreage. The yield of rapeseed-mustard was 1,142 kg ha -1 as compared to 969 kg ha-1 of total oilseeds (Anonymous 2010).

The production potential of mustard is not being fully exploited because of the lack of proper information to the farmers about agronomic practices like, Irrigation schedule, intercropping, sulphur application and inorganic fertilizers on mustard production. The seed yield and oil quality of mustard can be improved by proper adjustment of row in intercropping sulphur and phosphorus fertilizer applicaton.

Indian mustard (Brassica juncea L.) commonly known as raya, rai or laha is an important oilseed crop. Among the brassica group of oilseed crops in India, it possesses a higher potential of production per unit area than other members of family crucifer. It produces basic raw materials for agro-based industries despite of large acreage covering 20.7 million hectare under various oil seeds of different agro-climatic zones of this country. The present average per capital consumption of oil and fats has not been more than 11 g/day as against the nutritional standard of 30 g/day for a balanced (Kawada and Murai, 1979) diet.

MATERIAL AND METHOD

Location and Climate

Prayagraj is located in the South-East part of Uttar Pradesh, India. The site of experiment is located at 25.57º N latitude, 81.51º E longitude and 98 meter above the sea level. This region has subtropical climate with extreme of summer and winter. The temperature falls down to as low as 1ºC - 2ºC during winter season especially in the months of December and January. The mercury rises up to 46ºC - 48ºC during summer.

Exprimental Materials

The experimental material consists of 13 treatments and seed of Yellow mustard, which were provided by Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) T_0-Unprimed (Control), T_1-KNO_3 (3%), T_2-KNO_3 (5%), T_3- Polyethylene Glycol (PEG_{6000}) @ 5%, T_4- Polyethylene Glycol (PEG_{6000}) @ 10%, T_5-Moringa leaf Extract @ 5%, T_6-Moringa leaf Extract @ 10%, T_7-Pungam leaf Extract @ 5%, T_8-Pungam leaf Extract @ 10%, T_9- Trichoderma viride @ 1%, T_{10}- Trichoderma viride @ 3%, T_{11}- Azosperilium @ 1% and T_{12}- Azosperilium @ 3%.

Table 1 - Analysis of variance for 9 growths and yield in yellow mustard

S. No.	Characters	Mean sum of square		
		Replications (df=2)	Treatments (df=12)	Error (df=24)
1.	Field emergence percentage	1.46	8.12*	3.43
2.	Plant height (cm)	143.05	99.26*	40.63
3.	Number of branches per plant	0.02	0.22	0.94
4.	Number of siliquae per plant	17.27	34.62*	15.13
5.	Number of seeds per siliquae	0.99	2.94*	1.20
6.	Seed yield per plant (g)	0.94	0.39*	0.15
7.	Seed yield per plot (g)	29.77	10.95*	4.32
8.	Biological yield (g)	108.96	110.25	109.82
9.	Harvest index (%)	9.37	5.00*	2.00

* Significant at 5% level of significance.

Table 2 - Mean performance of mustard for growths and yield

S.NO.	Treatments	Field Emergence percentage	Plant height (cm)	Number of branches per plant	Number of siliquae per plant	Number of seeds per siliquae	Seed yield per plant (g)	Seed yield per plot (g)	Biological yield (g)	Harvest index (%)
1	T_0	85.67	97.13	5.27	92.73	15.40	4.98	24.33	119.34	20.40
2	T_1	88.33	113.47	5.87	96.20	16.27	5.47	27.00	119.46	22.57
3	T_2	90.33	110.93	6.00	100.93	17.38	5.60	29.00	121.82	23.80
4	T_3	88.00	99.47	6.13	100.10	17.60	5.53	28.00	118.91	23.53
5	T_4	89.00	109.40	5.53	97.00	15.17	5.27	25.67	117.85	21.80
6	T_5	87.67	105.47	5.93	96.07	17.20	5.10	25.00	108.13	23.13
7	T_6	87.00	106.27	5.60	95.87	15.53	5.33	27.33	130.45	20.93
8	T_7	88.67	107.20	5.80	98.87	16.03	5.20	27.63	128.54	21.67
9	T_8	87.33	105.27	5.70	93.80	16.77	5.43	26.33	116.10	22.90
10	T_9	86.00	103.60	6.20	93.05	17.27	5.02	25.00	114.32	21.97
11	T_{10}	89.67	111.73	6.13	103.63	17.77	5.93	30.67	124.38	24.67
12	T_{11}	86.33	98.00	5.73	95.27	15.83	5.07	26.33	113.55	23.20
13	T_{12}	91.00	115.00	5.60	101.13	18.13	6.20	29.67	121.54	24.40
Grand Mean		88.08	106.38	5.81	97.28	16.64	5.39	27.08	119.57	22.69
C.D. (5%)		3.12	10.74	1.63	6.55	1.84	0.65	3.50	17.66	2.38
SE(m)		1.07	3.68	0.56	2.25	0.63	0.22	1.20	6.05	0.82
SE(d)		1.51	5.20	0.79	3.18	0.89	0.32	1.70	8.56	1.15
C.V.		2.10	5.99	16.66	4.00	6.57	7.19	7.68	8.76	6.23

RESULT AND DISCUSSION

Significant differences in all the field observations were observed due to environmental effect on different treatment of Yellow mustard. Significantly maximum percentage of field emergence (91.00%)was highest in T_{12}- Azosperiliuum @ 3%followed by T_2- KNO_3 (5%) (90.33%) and found to be lowest inT_0- Control (85.67%). Plant height at harvesting stage (115.00 cm) was highest in T_{12}- Azosperiliuum @ 3%followed by T_1- KNO_3 (3%) (113.47 cm) and found to be lowest in T_0- Control (97.13 cm).Number of branches per plant (6.20) was highest in T_9- Trichoderma viride @ 1% followed by T_{10}- Trichoderma viride @ 3% (6.13) and found to be lowest in T_0- Control (5.27). Number of siliquae per plant (103.63) was highest inT_{10}- Trichoderma viride @ 3% followed by T_{12}- Azosperiliuum @ 3%(101.13) and found to be lowest in T_0- Control (92.73).Number of seeds per siliquae(18.13) was highest inT_{12}- Azosperiliuum @ 3%followed by T_{10}- Trichoderma viride @ 3% (17.77) and found to be lowest in T_0- Control (15.40). Significantly maximum seed yield per plant(6.20 g) was highest in T_{12}- Azosperiliuum @ 3%followed by T_{10}- Trichoderma viride @ 3% (5.93 g) and found to be lowest in T_0- Control (4.98 g).Seed yield per plot (30.67g) was highest in T_{10}- Trichoderma viride @ 3% followed by T_{12}- Azosperiliuum @ 3%(29.67 g) and found to be lowest in T_0- Control (24.33 g).

CONCLUSIONS

Pre-sowing seed treatment increases the germinability and vigour of yellow mustard seeds, significantly in field condition. Pre-sowing seed treatment with Azosperilium (3%) followed by KNO_3 (5%), Trichoderma Viride (3%), PEG_{6000} (10%) and Pungam leaf extract (5%), significantly increased the germination percentage and plant growth of yellow mustard comparison to control. Pre-sowing seed treatment with Trichoderma Viride (3%) followed by Azosperilium (3%), KNO_3 (5%), PEG_{6000} (5%), and Pungam leaf extract (5%) significantly increased the yield and yielding attributes of yellow mustard. Pre-sowing seed treatment with Trichoderma Viride and Azosperilium showed maximum

increase in germinability, vigour of yellow mustard seeds and found to be lowest in control seeds. Pre-sowing seed treatments of the mustard seeds for 8 hrs, in which Trichoderma Viride give best result to enhanced germinability, seed vigour and yielding attributes. These conclusions are based on the results of six months investigation and therefore further investigation is needed to arrive at valid recommendations.

REFERENCES

Abdulrahmani B, Ghassemi-Golezani K, Valizadeh M, Feizi-Asl V (2007). Seed priming and seedling establishment of barley (*Hordeum vulgare*L). J. Food. Agric. Environ. 5: 179-184.

Ajith PS Lakshmidevi N (2010). Effect of Volatile and Non-volatile compounds from *Trichoderma spp*. against *Colletotrichum capsici* incitant of Anthracnose on Bell peppers. *Nature and Science*. 8(9): 265-269.

Akinbode OA (2010). Evaluation of some plant extracts on *Curvularialunata*, the causal organism of maize leaf spot. *African Journal of Environmental Science and Technology*.4(11): 797-800.

Aladjadjiyan A (2007). The use of physical method for plant growing stimulation in Bulgaria. J. Centre European Agric., 8(3), 369-380.

Alam S, Kee-Don H, Lee JM, Hur H, Shim JO, Chang KC, Lee TS, Lee MW (2004). In vitro effects of plant extracts, and phytohormones on mycelia growth of Anthracnose fungi. *Microbiology*.32(3): 134-138.

Al-Askar AA, Rashad YM (2010). Efficacy of some plant extracts against *Rhizoctonia solani*on pea. *Journal Of Plant Protection Research*. 50(3): 239-243.

Amadioha AC (2000). Fungitoxic effect of some leaf extract against *Rhizopus oryzae*. *Int. J. Pest Manage*. 52: 311-314.

Anonymous (2012). *http://www.faostat.org.* Food and Agricultural Organization of the United Nations.

Anonymous (2016). Agriculture statistics at a glance, pp 124-125.

Basem FD Khalil A (2007).The inhibitory effects of extracts from Jordanian medicinal plants against phytopathogenic fungi. *Plant Pathology Journal*.6(2): 191-194.

Basra SMA, Zia MN, Mahmood T, Afzal I, Khaliq A (2003). Comparison of different invigoration techniques in wheat (*Triticum aestivum L*.) seeds.*Pakistan Journal of Arid Agriculture,* 2:11-16.

Bilal AP, Sharma P, Kapil R, Pathania A, Sharma O (2010). Evaluation of Bioagents and Biopesticides against *Colletotrichum lindemuthianum* and its Integrated Management in Common Bean.*Notulae Scientia Biologicae.* 2 (3): 72-76.

Biljana, G. and J. Ziberoski. (2011).The influence of *Trichoderma harzianum*on reducing root rot disease in tobacco seedlings caused by *Rhizoctonia solani. Int. J. Pure Appl. Sci. Technol.* 2(2): 1-11.

Celar, F. and N. Valic. (2005). Effects of *Trichoderma* spp. and *Gliocla diumroseum* culture filtrates on seed germination of vegetables and maize. *Journal of Plant Diseases and Protection*.112 (4): 343–350.

Cornea C. P., A. Pop, S. Matei, M. Ciuca, C. Voaides, M.aMatei, G. Popa, A. Voicu, M. Stefanescu. (2009). Antifungal action of new *Trichoderma spp.* Romanian isolates on different plant pathogens. XI Anniversary Scientific Conference.766-770.

Ebtsam MM, Abdel-kawi KA Khalil MNA (2009). Efficiency of *Trichoderma viride* and *Bacillus subtilis*as Biocontrol Agents against Fusariumsolani on Tomatoplants. *Egypt. J. Phytopathol*. 37(1): 47-57.

EL-Araby MM, Hegazi AZ (2004). Responses of Tomato to Hydro and Osmo- Priming, and Possible Relations of Some Antioxidants, Enzymes and Endogenous Polyamine Fractions. *Ezyptian Journal of Biology,* 6:81-93.

El-Katatny MH Abeer SE (2012). Control of post harvest tomato rot by spore suspension and antifungal metabolites of *Trichoderma harzianum. Journal of Micro, Biotech and Food Sci*. 1(6): 1505-1528.

Haggag WM, Mohamed HA (2007). Biotechnological aspects of microorganisms used in plant biological control. In *American-Eurasian J. Sust. Agric*. 1(1): 7-12.

Haggag WM, Mohamed HA (2007). Biotechnological aspects of microorganisms used in plant biological control. In *American-Eurasian J. Sust. Agric*. 1(1): 7-12.

Harman GE, Kubicek CP (1998). *Trichoderma*and *Gliocladium*. Taylor & Francis, Ltd., London. United Kingdom.

Ibrahim MB (1997). Anti-microbial effects of extract leaf, stem and root bark of *Anogeissusleiocarpus*on *Staphylococcus aureaus, Streptococcus pyogenes, Escherichiacoli* and *Proteus vulgaris*. *J. Pharma. Devpt*.2: 20-30.

Ibrahim MB (1997). Anti-microbial effects of extract leaf, stem and root bark of *Anogeissusleiocarpus*on *Staphylococcus aureaus, Streptococcus pyogenes, Escherichiacoli* and *Proteus vulgaris*. *J. Pharma. Devpt*.2: 20-30.

IES (2002-2003). www.indiastat.in

Kumar A, Chauhan JS (2005). Status and future thrust areas of rapeseed-mustard research in India. Indian Journal of Agricultural Sciences. 75 (10):621-635.

US Department of Agricultural Research Service, (2016). Nutrient Data Laboratory. USDA National Nutrient Database for standard Research, Released 28. Version Current: May 2016.