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Influence of Seed and Crop Management Techniques on Productivity of Maize Hybrid CoH(M) 5

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Studies were initiated to evaluate the influence of seed priming technique (15 per cent *Azospirillum* + 15 per cent phosphobacteria, 10 per cent *P. fluorescens* + 20 per cent humic acid, 15 per cent *Azophos* + 10 per cent *P. fluorescens* and hydro priming technique) in conjunction with crop management techniques viz., nutrient supplementation as basal (humic acid @ 10kg ha^{-1}, micronutrient 5kg ha^{-1}) and foliar (diammonium phosphate 2 per cent, humic acid 0.1 per cent, sea weed extract 0.5 per cent) along with NPK application. The results revealed that seeds primed with 20 per cent humic acid + 10 per cent *P. fluorescens*, applied with humic acid @ 10 kg ha^{-1} as basal application and sprayed with 0.5% sea weed extract as crop management technique improved the productivity of maize and grain recovery. The contribution of seed management technique was higher than crop management techniques.

Key words: Maize, Priming, Humic Acid, Seaweed Extract, Grain Yield.

Crop productivity is the expression of genomic and environmental interaction (Ghosh, 1991) and could be streamlined by adoption of advanced seed and crop management techniques (Chapman, 2008). Maize popularly rated as “Queen of Cereals” occupies third important global cereal crop next to rice and wheat. Hence, studies were initiated with the newly developed maize hybrid COH(M)5, to trace the influence of seed and crop management technique on grain productivity.

Materials and Methods

The field trial was conducted at Department Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore (11°1′6″N, 76°58′21″E) during Kharif, 2011 under irrigated conditions using genetically pure seeds of maize hybrid COH(M)5. The crop was raised adopting the following seed and crop management technique,seed treatment implied using liquid form of biofertilizers and biocontrol agents. The Humic acid was obtained from Neyveli Lignite Corporation, while the seed weed extract used was a commercial product (Agromin®).

Seed priming techniques (priming agents in liquid form) Soaking duration -6h Seed to Solution Ratio - 1:1	Crop management techniques: Supplementation of NPK nutrients (175:75:75) as	
	Soil Application (Basal)	Foliar application (at tassel and silk initiation stages)
Unprimed seed	Humic acid (10kg ha^{-1})	Di Ammonium Phosphate 2 %
Hydropriming		
15 % *Azospirillum* + 15 % Phosphobacteria		Humic acid 0.1 %
10 %*P. fluorescens* + 20 % Humic acid	Micronutrient mixture @ 5kg ha^{-1}	
15 % Azophos + 10 % *P. fluorescens*		Sea weed extract 0.5 % (Agromin)

The crop raised with the above treatmental schedule was evaluated for the yield and yield attributing characters viz., cob weight. plant^{-1} (g), kernel yield. plant^{-1} (g) and kernel /grain yield. plot^{-1}(kg), which was computed to grain yield per hectare. The data were statistically scrutinized as per Gomez and Gomez (1984).

Results and Discussion

Crop productivity is the output of complex edaphic, environmental and management factors (Zortia and Canigia, 2009). The results of the present study revealed that the seed treatments (T), nutrient supplementation both as basal (S), foliar (F) and their interactions significantly varied with the evaluated parameters (Table 1).The seeds primed with 20 per cent humic acid and 10 per cent *P. fluorescens* (mixed in 1:1 ratio) recorded maximum values for cob weight. plant^{-1} (g), kernel yield. plant^{-1} (g) and kernel /grain yield. plot^{-1}(kg) which was 12, 11 and
6 per cent higher than unprimed seeds. Amutha *et al*., (2008) also observed similar results in *Cyamopsis tetragonoloba* L. Taub and expressed the synergistic influence of *P.flurorescens* and humic acid as cause for the improved yield due to invigourative growth promotive action. Supplementation of the NPK nutrient with micro nutrient and humic acid revealed that application of humic acid @10kg ha^{-1} had better influence on productivity than micronutrient applied @ 5 kg. ha^{-1}. Virgine and Singaram (2007) also expressed that soil application of humic acid (20 kg ha^{-1}) along with
100 per cent RDF improved the seed yield due to enhanced uptake of nutrients (Sathyabama *et al.,* 2004). Application of 0.5 per cent sea weed extract as foliar excelled the application of 0.5% humic acid and 2% DAP in improving the yield attributing characters

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Table 1. Influence of seed and crop management techniques on productivity of maize hybrid COH(M)5

Seed priming Techniques (T) A-Azospirillum P- phospho bacteria HA - Humic acid (Soaking duration - 8h and seed to solution ratio 1:1)	Crop Management Techniques											
	Soil Nutrient Supplementation (S) along with NPK @ 175:75:75 Kg/ha(RDF)											
	Micronutrient @ 5 Kg/ha				Humic acid @ 10 Kg/ha				TxF			
	Foliar sprays(F)											
	DAP 2%	Humic acid 0.1%	Sea weed extract 0.5%	Mean	DAP 2%	Humic acid 0.1%	Sea weed extract 0.5%	Mean	DAP 2%	Humic acid 0.1%	Sea weed extract 0.5%	Mean
						Cob weight plant^{-1} (g)						
Unprimed	95.6	91.1	100.7	95.8	95.1	98.1	101.2	98.1	95.4	94.6	101.0	97.0
Hydropriming	94.7	91.2	99.6	95.2	94.9	98.8	101.7	98.5	94.8	95.0	100.7	96.8
15%A+ 15% P	98.8	94.9	103.4	99.0	97.8	102.2	106.4	102.1	98.3	98.6	104.9	100.6
20% HA + 10% P	100.2	97.1	106.3	101.2	99.1	105.1	108.9	104.4	99.7	101.1	107.6	102.8
15%A +10 % P	99.6	96.5	105.1	100.4	98.3	104.3	107.1	103.2	99.0	100.4	106.1	101.8
Mean	97.8	94.2	103.0	98.3	97.0	101.7	105.1	101.3	97.4	97.9	104.0	99.8
	T	F	S	TxF	TxS	SxF	TxFxS					
SEd	1.97	1.69	1.16	3.35	2.12	1.27	4.91					
CD (P=0.05)	3.96**	3.38*	2.32 *	3.70*	4.24*	2.54*	9.82*					
						Kernal weight plant^{-1} (g)						
Unprimed	43.9	47.7	51.6	47.7	46.6	50.8	53.3	50.2	45.2	49.3	52.5	48.9
Hydropriming	46.6	49.3	55.1	50.3	48.5	52.7	56.8	52.7	47.7	51.0	56.1	51.5
15%A+ 15% P	51.6	56.1	62.5	56.8	54.5	60.1	64.9	59.8	53.1	58.2	63.8	58.2
20% HA + 10% P	59.9	63.1	71.0	64.5	61.6	68.0	73.8	67.7	60.9	65.5	72.4	66.2
15%A +10 % P	55.5	59.1	65.7	60.2	57.5	63.5	68.9	63.3	56.6	61.4	67.4	61.7
Mean	51.5	55.0	61.2	55.9	53.7	58.9	63.3	58.7	52.5	56.8	62.2	57.2
	T	F	S	TxF	TxS	SxF	TxFxS					
SEd	1.04	0.95	0.71	1.89	1.46	1.25	3.43					
CD (P=0.05)	2.08**	1.90*	1.42 *	3.78*	2.92*	2.49*	6.86*					
						Plot yield (kg) (2x 1.75 m)						
Unprimed	2.34	2.32	2.40	2.36	2.33	2.40	2.52	2.42	2.34	2.36	2.46	2.39
Hydropriming	2.35	2.34	2.47	2.39	2.34	2.41	2.54	2.43	2.35	2.38	2.50	2.41
15%A+ 15% P	2.50	2.51	2.57	2.53	2.45	2.56	2.63	2.55	2.48	2.54	2.60	2.54
20% HA + 10% P	2.61	2.56	2.70	2.63	2.57	2.80	2.91	2.76	2.59	2.68	2.80	2.69
15%A +10 % P	2.55	2.53	2.62	2.57	2.50	2.61	2.72	2.61	2.52	2.57	2.67	2.59
Mean	2.47	2.46	2.55	2.49	2.44	2.56	2.66	2.55	2.46	2.51	2.61	2.52
Level of Significance	T	F	S	TxF	TxS	SxF	TxFxS					
SEd	0.04	0.03	0.02	0.06	0.05	0.04	0.09					
CD (P=0.05)	0.07**	0.05**	0.04**	0.12 *	0.09*	0.07*	0.18*					
						Grain yield ha^{-1} (Kg)						
Unprimed	6354	6312	6512	6393	6325	6502	6794	6540	6340	6407	6653	6467
Hydropriming	6376	6352	6682	6470	6354	6536	6838	6576	6365	6444	6760	6523
15%A+ 15% P	6762	6782	6921	6822	6622	6904	7064	6863	6692	6843	6993	6843
20% HA + 10% P	6906	7027	7259	7064	6934	7504	7765	7401	6981	7266	7512	7253
15%A +10 % P	6881	6837	7041	6920	6742	7026	7295	7021	6812	6932	7168	6971
Mean	6656	6662	6883	6734	6595	6894	7151	6880	6638	6778	7017	6811
Level of Significance	T	F	S	TxF	TxS	SxF	TxFxS					
SEd	88.43	68.50	55.93	153.17	125.06	96.87	216.62					
CD (P=0.05)	177.03**	137.13**	111.96**	306.64*	250.37*	193.93*	425.24*a					

RDF (Recommended dose of fertilizer), * *significant at 1%, *significant at 5%

and thereby the yield ,which recorded 6 and 4 per cent higher yield than 2 per cent DAP and 0.1 per cent humic acid respectively. This hike might be due to higher nutrient content of sea weed extract which is rich in potash (Naganathan *et al.,* 2008) carbohydrates (Anitha *et al.,* 2008) and amino acids (Nedumaran *et al.,* 2008) .

The interaction between seed treatment and foliar spray revealed that seed primed in 20 per cent humic acid + 10 per cent *P. fluorescens* and sprayed with seaweed extract (0.5 %) recorded the highest grain yield per plant and grain yield per ha (7382 kg), while the interaction between seed treatment and nutrient supplementation as basal application along with recommended NPK revealed that seed primed with humic acid (20 %) + *P. fluorescens* (10 %) and applied with humic acid @ (10kg/ha) as supplementary soil nutrient recorded the highest grain yield (7401kg/ ha),while the seed treatment and foliar nutrient interaction exposed that humic acid (10kg/ha) along with seaweed extract (0.5 %) foliar spray recorded the highest values for yield attributing characters and yield (7099kg/ha). The interaction between seed treatment, basal nutrient supplementation and foliar

spray revealed that seed priming with 10 per cent *P. fluorescens* + 20 per cent humic acid ,supplemented with basal application with humic acid @ 10 kg. ha^{-1} along with NPK and sprayed with 0.5 per cent seaweed extract as foliar application improved the grain yield per plant and had a better grain yield ha^{-1} (7504 kg). Thus the study on COH(M)5 maize hybrid revealed that primed seed (15 per cent *P. fluorescens* and 10 per cent humic acid) received with humic acid (10 kg/ha) supplementation along with NPK followed with foliar application of sea weed extract (0.5 per cent) twice at tasseling and silk initiation stages rendered protective, invigourative and nutritive advantages and improved the productivity by improving the yield attributing characters .

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