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Efficiency of Phytohornes on Vigour Index of*Vignaradiata* (L.)Wilczek Var.

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Abstract

***Vignaradiata* (L.) Wilczek Var**. belong to family Leguminaceae, sub- family,papilionaceae.In Maharashtra, the green gram grown as a pulse crop. It is one of the most ancient legumes of India and is still an important crop. It rich in protein and commonly called as 'dal'. The response on seed germination of ***Vignaradiata*(L.) Wilczek Var.**was investigated on IAA, GA, SA and 2,4-D, in different concentrations viz., control (000) 500, 1000, 1500 and 2000 ppm respectively. The higher percentage of seed germination was occur in SA in high concentration at 1500ppm (90%) followed by IAA (80%). The plant length and root length were significantly increased in all concentrations of IAA, GA, and SA. 2,4-D did not show any significant difference. The shoot length was moderate in all hormones except GA. The number of leaves, fresh weight and biomass did not variable as compared to control. The result showed that SA and IAA increased seed germination, plant length and root length. As cell elongation hormone the GA showed increased in plant length, shoot length and root length.

Key words:*Vignaradiata*(L) Wilczek Var.,hormone, IAA, GA, SA, 2, 4-D.

INTRODUCTION

Seeds of pulses have a "hard" seed coat impeding germination. The environmental factors like temperature, humidity, PH of soil, shortage as well as an excessive quality of moisture can reduce seed germination. The dormancy of seeds could be broken by giving treatment like presoaking of seeds in different PGRs and chemicals and help to increase germination and yield of crop.Exposing the seed to repeat wetting and drying has been shown to

enhance its ability to withstand drought, high temperature low temperature and salinity.Presoaking of the seed is described as a treatment preliminary to sowing during which seeds are moisten and dried back (once or a number of times) to activate certain physiological and biochemical processes which will enhance the seedling growth and final productivity.(Saxena,1985). Application of IAA, GA and ABA on ***Sopindustrifioliatus***vahl. GA_3 is more effective in improving the seed germination in soap nut than IAA and ABA Naidu et al, (2000). The cotton seeds soaked in IAA solutions 25, 50 and 75ppm for a period of 12 hour. The lower concentration 25ppm gave best result in number of main stem, number of first flower and first open ball earliness %, number of open balls per weight, seed cotton yield per plant and seed index were increased, Sayed and ***et al*** ,(2006). The application of IAA in tissue culture of ***Leucadendronlaxum*** (proteaceae) was found effective in rooting ***L. laxum*** plant, Laubscher and Nakidemi (2008).

Salicylic acid (SA), a plant phenolic is now considered as a hormone like endogenous regulation and its role in the defence mechanisms against biotic and abiotic stress has been well documented (Szalai**et al**, 2000 and Yalpani, ***et al*** 2004). It was found that inhibition of catalase, a H_2O_2 scavenging enzyme, by SA plays an essential role in the generation of reactive oxygen species (Horvath ***etal***2002). By increasing H_2O_2 concentration of the tissues, moderate does of SA may activate the antioxidative mechanism. Application of exogenous SA enhanced the drought and salt stress resistance of plants (Tari***et al*** 2002 and Senaratna***et al*** ,2000); but the results were contradictory and depended on the developmental phase of plant (Borsani, ***et al*** ,2001) or on the experimental conditions (Nemeth, ***et al*** , 2002). Both high salinity and drought give rise to ionic and osmotic effects combined with oxidative damage in tissues. Previous study demonstrated that SA plays an important role in determining the sensitivity of plants to various biotic stresses (Dat***et al***, 1998 and Rao, 1999). The inclusion of SA at 0.5 mM in the germination medium was associated with increase germination percentage of tomato (Munns, ***et al*** 2002).

In addition to other PGRs 2, 4-D also plays an important role in the metabolisms. Previously many investigators were used it as growth stimulatory hormone various

supplementary MS medium in tissue culture. Though its main role is herbicide but earlier it is used as growth promoting hormone.

Williams and Leonard, (1959), observed the effect of 2, 4-D on Rose clover seed germination. The Amine and ester are the formulations of 2, 4-D did not reduce the germination of seed of rose clover when applications made during and early bud stages. But the seed and forage yields were reduced by both formulations. The ester formulation found more toxic than amine. Both when applied during bloom stage the germination and seed production were decreased drastically and when applied during seeds were ripe it was found effective.

Moffett ***et al*** (1980) studied the effect of 2, 4-D spraying on cotton. In cotton crop the honey bees are visit to flower and help to produce hybrid variety. In the sense of increase in nectar concentration in the flower 2, 4-D 1 ppm / 187 L water was sprayed on crop at the beginning of bloom increased the volume of floral nectar. And higher concentration found to crop and when plants started to flowering the spraying 2, 4-D was found more effective to increase the volume of nectar. But 1ppm concentration was not found effective to increasing the cotton yield and sugar concentration of Flower.

Choudhari and Kar, (2008), demonstrated the effect of PropyleGallate, Hydrogen peroxidase and Ethylene in ***Vignaradiata***. In their experiment they soaked the seeds in 1,10, and 50mM in propylegallate and in 10 mM and 50 mM sucrose solution and in water solution for a different period 6,8,10 and 12 hours respectively and also combined solution of propylegallate and Hydrogen peroxidase. They observed that higher concentration of propylegalcate (10 and 50 mM) caused total inhibition even after 48 hours. In cross check sucrose solution the 100% germination was recorded in sucrose solution where as fresh and dry weight also good in sucrose and water solution.when seeds were pretreated with propylegallate and transferred in to water the germination also lower then control. In combined treatment of propylegallate and Hydrogen peroxidase show 70 % germination Hydrogen peroxidase was found to be effective in all aspects of seed germination in ***Vignaradiata,.*** In combination of Ethylene and PG and triple combination PG, ethylene and hydrogen peroxidase the germination rate was same to control rate. They

suggested that the inhibition of propylegallate could be possible by the recovery of ethylene and hydrogen peroxidase.

The aim of present research work is to increase the vigour index of *Vignaradiata*plant according to the demand. It can be concluded that moderate concentration of SA and IAA enhance the seed germination and seedling growth and GA also increases plant growth but not to enhance seed germination.

MATERIALS AND METHODS

The hormones were purchased from Unique Agro –Chemical Stores, Tuljapur. Seeds of green gram were purchased from local market of Naldurg Ta. Tuljapur, Dist.Osmanabad (Marathwada,Maharashtra). Ten seeds were taken and their dry weights were taken on electronic balance in Laboratory of Department of Botany, in A.S. C. College, Naldurg. The seeds were presoaked of each IAA, GA, SA and 2, 4-D in 000(control), 500,1000,1500 and 2000 ppm concentration solutions for a constant period of four hours under room temperature. Then seeds were removed from solutions and soaked in 1% $HgCl_2$ solution for five minutes to avoid fungal infection.

Seeds then sown in 18x08 cm polythene bags which were poured in black soil then kept in 5x5m randomized plots in Arts, Science, and Commerce College, Ladies Hostel Campus, Naldurg. The experiment was repeated in four replicates. The irrigation was done according to the need. The seeds soaked in distilled water for a period of 4 hours were considered as control. The germination was recorded after seven days. The shoot length, root length, fresh weight, number of leaves and dry weight were measured after 30 days.

Result and Discussion

Table No. 01 - Effect of IAA on Seed Germination of *Vigna Radiata* L.

Sr. No.	Conc.	No of Seeds	Dry wt. of Seeds (gm)	% of Germi nation	Plant length (cm)	Shoot length (cm)	Root length (cm)	No. of leaves	Fresh wt. (gm)	Dry wt. (gm)
1	000	10	0.51	40	28.65	16.55	12.10	7	6.85	4.08
2	500	10	0.55	40	**41.60**	8.60	**33.00**	6	3.30	2.81
3	1000	10	0.49	50	**44.60**	9.48	**35.12**	6	3.50	2.84
4	**1500**	10	0.59	**80**	**44.03**	8.98	**35.05**	6	6.08	4.89
5	2000	10	0.49	60	**38.34**	10.38	**27.96**	6	3.60	2.19
SD			**0.043**	**16.733**	**6.519**	**3.284**	**9.697**		**1.668**	**1.096**
SE			**0.019**	**7.484**	**2.916**	**1.469**	**4.337**		**0.746**	**0.490**
CD			**0.054**	**20.804**	**8.105**	**4.083**	**12.056**		**2.074**	**1.362**

The table number (01) includes the results were obtained the effect of IAA on seed germination of green gram. It was found that the germination was significantly increased at high concentration i.e. 1500 ppm and significantly decreased at low concentration. The plant length was significant in all concentration, the root length also significantly increased in all concentration but the shoot length did not show any significant difference. Where as number of leaves and dry weight was not variable as compared with control.

IAA as it shows the significant increase in the germination, plant length and root length. It is found hibitory, because IAA is a PGR and it might have shown the hibitory effect on the physiological metabolism.

The similar result also recorded by Sakdev (1996). She found that though the IAA was not stimulate in germination of green gram but it promotes the shoot and root, length and also in dry weight.

Table No. 02 - Effect of GA **on Seed Germination of*Vigna Radiata* L.**

Sr. No.	Conc.	No of Seeds	Dry wt. of Seeds	% of Germi	Plant length	Shoot length	Root length	No. of leaves	Fresh wt.	Dry wt. (gm)

			(gm)	nation	(cm)	(cm)	(cm)	(cm)	(gm)	
1	000	10	0.51	40	28.65	16.55	12.10	7	6.85	4.08
2	500	10	0.50	50	29.66	17.74	11.92	6	2.65	0.86
3	1000	10	0.46	50	33.16	19.24	13.92	6	2.68	0.78
4	1500	10	0.52	50	41.68	27.48	14.20	6	1.78	0.83
5	2000	10	0.63	50	37.82	13.88	23.94	6	1.65	0.91
SD			**0.063**	**4.472**	**5.512**	**5.142**	**4.985**		**2.138**	**1.448**
SE			**0.028**	**2.000**	**2.465**	**2.300**	**2.229**		**0.956**	**0.647**
CD			**0.079**	**5.560**	**6.854**	**6.393**	**6.198**		**2.658**	**1.800**

As per thetable Number (02) the effect of GA on seed germination of green gram .

It was found that the germination was significantly decreased as per the concentration was increased. The plant length was insignificant in low concentration but it was significantly increase in at high concentration. Shoot length was moderate but it was significant in at 1500 ppm solution. Whereas the number of leaves and weight did not show any significant effect.

The GA as it shows the insignificant in the germination of green gram seed germination. It is found inhibitory, but it was promote the plant length. Because GA is a PGR and it show the effect of cell elongation in physiological metabolism.

Sakdev(1996), was also recorded a significant response of GA3 in at low concentration in green gram seed germination and other seedling characters. Naidu ***et al***(2000), reported the good response of GA3 in the seed germination in soapnut.

While in controversy Ayse and l Gomurgen, 2000, noted that when seeds of ***Eranthus hymelis*** **(L.)** were soaked in different concentration of GA3 under the different temperature did not found improvement in the germination. Butola and Bodola (2004) also reported inhibitory effect in ***Angelica glauca*** seeds.

Table No. 03 - Effect of SA on Seed Germination of*Vigna Radiata* L.

Sr.	Conc.	No of	Dry wt.	% of	Plant	Shoot	Root	No. of	Fresh	Dry

No.		Seeds	of Seeds (gm)	Germination	length (cm)	length (cm)	length (cm)	leaves	wt. (gm)	wt. (gm)
1	0	10	0.51	40	28.65	16.55	12.10	7	6.85	4.08
2	500	10	0.69	80	42.49	13.27	29.22	6	7.40	4.87
3	1000	10	0.39	60	46.75	13.70	33.05	6	6.70	4.65
4	1500	10	0.62	90	42.1	11.84	30.26	6	7.1	4.83
5	2000	10	0.46	60	60.34	13.28	47.06	6	6.20	3.80
SD			**0.121**	**19.494**	**11.358**	**1.728**	**12.459**		**0.450**	**0.480**
SE		**1.**	**0.054**	**8.718**	**5.080**	**0.773**	**5.572**		**0.201**	**0.214**
CD			**0.150**	**24.236**	**14.122**	**2.148**	**15.490**		**0.559**	**0.596**

As per the tablenumber (03) theresults wereobtained theeffect of SA on seedgermination of green gram seed.

It showed that the % germination was significantly increased in at 500 and 1500 ppm concentration solution and it was decreased in 1000 and 2000 ppm concentration solution. The plant length and root length was significantly increased but plant length was significantly decreased in at 1500 ppm concentration, while dry weight was significantly increased in 500 and 1500 ppm solution. The number of leaves were did not found variable .Shoot length was moderate as per the result of treatment and root length was found grater then shoot length.

SA as it show the significantly increase in the germination, plant length, root length and dry weight. In green gram seed, SA gave best results; it is found hibitory, because it is a characteristic of PGR.

A similar results also recorded by Yildirin and Dursun (2008), SA application was found good in growth of tomato, chlorophyll content in leaves, fruit characteristics and total tomato yield. The highest yield was recorded in moderate concentration. (0.50ppm)

Table No. 04 - Effect of 2,4-Don Seed Germination of*Vigna Radiata* L.

Sr. No.	Conc.	No of Seeds	Dry wt. of Seeds (gm)	% of Germination	Plant length (cm)	Shoot length (cm)	Root length (cm)	No. of leaves	Fresh wt. (gm)	Dry wt. (gm)
1	000	10	0.51	40	28.65	16.55	12.10	7	6.85	4.08
2	500	10	0.61	20	36.70	9.30	27.40	6	1.87	0.95
3	1000	10	0.56	60	22.40	8.80	13.96	6	4.65	2.78
4	1500	10	0.47	40	26.62	7.25	19.37	6	4.25	2.52
5	2000	10	0.55	20	26.55	7.4	19.15	6	2.05	1.82
SD			**0.053**	**16.733**	**5.275**	**3.842**	**5.956**		**2.057**	**1.164**
SE			**0.024**	**7.484**	**2.359**	**1.718**	**2.664**		**0.920**	**0.520**
CD			**0.066**	**20.804**	**6.559**	**4.777**	**7.405**		**2.557**	**1.447**

As per the table number (04) the effect of 2,4-D on seed germination of greengram.

It show the % germination was significantly decreased as per the concentration was increased. Plant length and root length was found insignificant but it was significantly increased in at 500 ppm concentration, shoot length ,number of leaves and dry weight were did not show any significant difference.

2,4-D as it showed the significant decrease in % germination of green gram seed. It is found inhibitory because 2,4-D isa herbicide and it might have shown the inhibitory effect on metabolism.

The result obtained in present study was not recorded previously.

CONCLUSION

From present study it can be concluded that SA and IAA (1500 concentration) enhance the seed germination and seedling growth. Whereas GA also increases plant growth but it fails to enhance seed germination. 2, 4-D might not show any effect in germination as well as plant growth as it washerbicide.

REFERENCES

1) AbiraChaudhari and Rup Kumar Kar, (2008). Inhibition of Seed Germination by Propylegallate, A Free Radicle Scavenger and Recovery of Germination by Hydrogen Peroxide and Ethylene in *Vignaradiata*. In: World. J. Agricultural Sciences 4(5): 914-921,2008. ISSN 1817-3047.

2) Amin A.A. EL-sh. M. Rashad, and H.M.M. EL-Abagy.(2007). Physiological Effect of Indole -3-Butyric Acid and Salicylic Acid on growth, Yield and chemical constituents of Onion plants. In: J. Applied sciences Research. Vol.3, no.11: PP. 1554-1563.

3) Borsani 0., V. Valpuesta and M.A. Botella, (2001). Evidence for a role of salicylic acid in the oxidative damage generated by NaCl and somotic stress in *Arabidopsi*s seedlings. Plant physiol., 126:1024-1030.2001.

4) C.P. Laubscher and, P.A., Nakidemi (2008). The effect of indole acetic acid growth regulator and rooting of Indole Acetic Acid Growth Regulator and Rooting mediums on Rooting of *Leucadendronlaxum* (Proteaceae) in a shade Tunnel Environment. Arch. American Eurasin J. Agric. and Environ. Sci, 4(3) 326-332, 2008.

5) Dat J.F., H. Lopez – Delgado, C.H. Foyer and I.M. Scott, (1998). Parallel changes in H2O2 and catalase during thermo-tolerance induced by salicylic acid or heat acclimation in mustard seedlings. Plant physiol., 116:1351-1357.1998.

6) E. yildrin and A. Dursun, (2008) Effect of foliar Salicylic Acid application on plant Growth and yield of tomato under greenhouse conditions Abst. In : ISHS Acta Hort. 807. Interationalsymp. On strategies towards sustainability of protected cultivation in mild winter climate.

7) El-Sayed, E.A. and M.EL- Menshawi, (2006). Influence of IndoleAcetic acid (IAA) application under different planting dates on growth and yield of Giza-88 cotton cultivar. In: Egypt. J. Agric. Res, 84(2) 2006.

8) Horvath, E., T. Janda, G. Szalai and E Paldi, (2002). In vitro salicyclic acid inhibition of catalase activity in maize: differences between the iso-enzymes and a possible role in the induction of chilling tolerance. Plant Sci., 163:1129-1135, 2002.

9) Jitendra S. Butola, and Hemant K. Badola, (2004). Effect of pre-soaking treatment on seed germination and seedling vigor in *Angelica glauca* a threatened medicinal herb. In: Current Science, Vol. 87, No, 6, PP-796 , 25 sept. 2004.

10) Josepho. Moffett, Lee S. Stith, Howard L. Morton and Charies W. Shipan. (1980). Effect of 2,4-D on CottonYield, Floral Nectar, Seed Germination, and Honeybee visits. In: Crop Science Society of America 20:747-750,1980.

11) Munns, R.S. Husain, A.R. Rivelli and R.A. Hare, (2002). Avenues for increasing salt tolerance of crops and the role of physiologically based selection traits. Plant and soil, 247: 93-105. 2002.

12) Naidu, C.V. Rajendrudu G., Swamy P.M. (2000). Effect of Plant growth regulators on seed germination of 252, 2000. *Sapindustrifoliatus*Vahi. In: J. Seed Science and Technology, Vol.28, no. 2, PP. 249-252, 2000.

13) Nemeth M., T. Janda, E. Horvath, E. Paldi and G. Szalai, (2002). Exogenous salicylic acid increases polyamine content but may decrease drought tolerance in maize. Plant Sci., 162: 569-574.2002.

14) Rao M.V. and R.D. Davis, (1999). Ozone – Induced cell death occurs via two distinct mechanisms in *Arabidopsis* : the role of salicylic acid. Plant J., 17: 603-614. 1999.

15) RukiyeTepirdamazAyse andNihalGomurgen, (2000). The effect of Temperature and Gibberllic Acid on Germination of *Eranthishymalis (L.)* salis. Seed.In:Turk J. Bot. 24, PP:143-145, 2000.

16) Sakdev, Babita, M. (1996) in. Ph. D Thesis, Dr. B. A. M. University, Aurangabad.

17) Samuel C. Wiggans, (1961). The Effect of Gibberllic Acid, Indole -3-Acetic Acid, and adninesulfate on the Emerence and Seedling Growth of Pecans. Proc. Of the okla.okla.Acad of Sci for 1962.In: Biological Science. J. Manuscript No. 864 of the Agri. Expt. Sta. PP: 64-70.

18) Saxena, O.P. (1985)- In: Widening Horizons of plant Sciences, Malik, C.P. (Ed.) 9:199-216. Cosmo publications, New Delhi.

19) Senaratna T., D. Tuochell, T. Bunn and K. Dixon, (2000). Acetyl salicylic acid (Aspirin) and salicylic acid induce multiple stress tolerance in bean and tomato plants. Plant Growth regul., 30:157-161.2000.

20) Szalai, G., I. Tari, T. Janda, A. Pestenacz and E. Paldi, (2000). Effects of Cold acclimation and salicylic acid on changes in ACC and MACC contants in maize during chilling. Biol. Plant, 43:637-640.

21) Tari I. J. Csiszar, G. Szalai, F. Horvath, A. Pecsvaradi, G. Kiss, A Szepesi, M.Szabo and L. Erdi, (2002). Acclimation of tomato plants to salinity stress after a salicylic acid pre-treatment. Acta Biol. Sreged, 46:55-56.2002.

22) W.A. Williams and O.A. Leonard, (1959). Effect of 2,4-D on the Growth Seed Production and Seed Viability of Rose Clover. In: Publised in Agron J. American Soc. Of Agronomy 6775. Segoe Rd., Madison, Wl 53711 USA. Vol. 51 PP:383-387.

23) Yalpani, N., A.J. Enyedi, J. Leon and Ozone (2004). Stimulate accumulation of salicyclic acid and pathogenesis related proteins and virus resistance in tobacco. Planta, 193: 373-376.2004.