Pak. J. Bot., 11 (2): 137-139, 1979.

EFFECT OF POTASSIUM NAPHTHENATE ON RICE (*ORYZA SATIVA* L.)*

R. ANSARI**, A.N. KHANZADA, S.M. NAQVI AND A.R. AZMI

Plant Physiology Division
Atomic Energy Agricultural Research Centre, Tandojam, Sind, Pakistan.

Abstract

Effect of seed soaking and foliar sprays of 0.1, 0.01 and 0.001% potassium naphthenate (K-Nap) solutions on rice *Oryza sativa* L., cv. IRRI-6 was investigated. Soaking of seeds in each of the solution significantly ($P < 0.05$) increased the number of productive tillers per pot but it did not materially affect the grain weight. K-NaP spray of 0.001%, in addition to seed soaking, further increased the straw weight but grain weight and number of grains per fertile tiller decreased.

Introduction

Naphthenic acid and its salts have been reported to possess plant growth stimulating properties (Husseinov, 1960; Krawchanka, 1966; Popoff & Boikov, 1966). Increased vegetative and reproductive growth in maize, winter cereals, tomato, potato and other crop, plant have been observed (Wort, 1969; Wort & Patel, 1970 a.b). Husseinov (1960) found that 0.5% of potassium naphthenate (K-Nap) increased the productivity. Therefore, in order to explore the possibility of increasing rice (*Oryza sativa* L., cv. IRRI-6) productivity through growth regulating chemicals, seed soaking and foliar sprays with K-Nap was investigated.

Materials and Methods

A stock solution containing 25% K-Nap (Ansari et al., 1978) was prepared from naphthenic acid (BDH chemicals) and various dilutions (0.1, 0.01 and 0.001%) in distilled water were prepared for seed soaking and/or foliar spray treatments. Fifty ml of each of the concentration was used to soak 1000 seeds for 24 hr before sowing in the nursery beds. After 45 days, seedlings were transplanted in plastic pots containing 6.5 kg of a loamy soil fertilized with 80 Kg N, 60 Kg P_2O5 and 50 Kg K_2O per hectare in the form of Urea, triple super phosphate and potash, respectively. After initial transplanting of 4 seedlings per pot only 2 plants were grown upto maturity. The pots were arranged in a randomized complete block design with 5 replications and were kept submerged in a

*The work was financed in part by agrant (FG-Pa-210) to R. Ansari made by the United States Department of Agriculture under PL-480 research programme. Contribution No. 79 from the Atomic Energy Agricultural Research Center, Tando Jam.

**Present Address: School of Biological Sciences, University of Sussex, Brighton, U.K.

Table 1. Effect of K-Nap on rice plant.

Treatments.	Total tillers/ pot	Productive tillers/ pot	Straw wt./pot (gm)	Grain wt./pot (gm)	No. of grains/fertile tiller.
Control (soaking in distilled water).	26^{d}	24^{ef}	64.2^{b}	38.5^{a}	72^{a}
Soaking in water + K-Nap 0.1% spray	26^{d}	22^{f}	65.6^{b}	33.8^{ab}	67^{a}
Soaking in water + K-Nap 0.01% spray	29^{bcd}	27^{abcd}	71.1^{ab}	30.9^{ab}	56^{ab}
Soaking in water + K-Nap 0.001% spray	28^{bcd}	24^{def}	68.1^{ab}	30.8^{ab}	58^{ab}
Soaking in K-Nap 0.1%	30^{bcd}	29^{abcd}	75.6^{ab}	40.7^{a}	64^{a}
Soaking in K-Nap 0.1% + spray 0.1% K-Nap.	30^{bcd}	29^{abcd}	75.0^{ab}	38.6^{a}	61^{ab}
Soaking in K-Nap 0.01%	32^{abc}	30^{abc}	73.8^{ab}	39.7^{a}	59^{ab}
Soaking in K-Nap 0.01% + spray 0.01% K-Nap.	27^{bcd}	24^{ef}	66.1^{ab}	30.7^{ab}	59^{ab}
Soaking in K-Nap 0.001%	33^{ab}	32^{a}	75.3^{ab}	38.8^{a}	54^{ab}
Soaking in K-Nap 0.001% + spray 0.001% K-Nap.	36^{a}	30^{ab}	82.6^{a}	26.6^{b}	42^{b}
S.E. ±	1.92	1.73	5.07	3.50	6.14

Values in vertical columns followed by the same subscript are not significantly different at 5% level.

water tank. Foliar spray, using the same concentrations, was applied to completely drench the plants at the flag leaf stage (60 days after transplanting). Controls were soaked in and sprayed with distilled water. Total number of tillers, productive tillers, grain per fertile tiller, straw and grain weight were recorded. Statistical analysis of the data was made by Duncan's multiple range test.

Results and Discussion

Seed soaking in 0.1, 0.01 and 0.001% K-Nap solution significantly ($P < 0.05$) increased the total number of productive tillers per pot (Table 1). Grain weight and number of grains per productive tiller was, however, similar to that of the controls. Seed soaking

followed by 0.001% K-Nap spray increased the number of productive tillers and straw weight. However, a decrease in the grain weight per pot occured due to a significant decrease in the number of grains per fertile tiller. A non-significant reponse was obtained for the remaining treatments relative to all other characteristics.

Our results regarding the vegetative responses to K-Nap treatments are similar to those already reported in the literature (Wort 1969; Wort & Patel, 1970 a,b; Fatah & Wort, 1970 a,b). These workers applied K-Nap as seed soak and foliar spray to bean, maize, spring wheat, sugar beet and radish and found stimulating effects on vegetative growth viz; plant height, fresh and dry weight of roots, stems and leaves, number of leaflets and leaflet area as well as yield. However, the present findings are at variance with others as far as the yield is concerned. The difference in results may be explained on the basis that in the growth regulator studies optimum time, dose, temperature and light intensity as well as mode of application, may vary with the crop or even within the cultivars, therefore, these parameters may not have been optimum in our experiment.

Acknowledgements

Grateful acknowledgement by one of us (RA) is made to Prof. D.J. Wort of the University of British Columbia, Canada, for helpful criticism during the preparation of this manuscript and to the BDH chemicals, London for free supply of naphthenic acid.

References

Ansari, R., S.M. Naqvi, Shaukat Ahmed, A.N Khanzada and M. Hanif. 1978. Effect of naphthenate on growth, yield, fibre quality and physiology of cotton. Final Report of PL-480 project No. PK-ARS-18. pp 95.

Fattah, Q.A. and D.J. Wort, 1970 a. Metabolic response of bushbean plants to naphthenate application. Can. J. Bot., 48: 861-866.

Fattah, Q.A. and D.J. Wort, 1970 b. Effect of light and temperature on stimulation of vegetative and reproductive growth of bean plants by naphthenates. Agr. J., 62: 576-577.

Husseinov, D.M. 1960. The influence of organic compounds of petroleum origin upon the growth of roots and crop capacity of agricultural plants. Trans. 7th Int. Congr. Soil Sci. Madison, Wis., 3: 253-259.

Krawchanka, L.U. 1966. Effect of petroleum growth substance on pollen germination in introduced trees. Vyestsi Aka. Navuk Byelaruski SSR Syeryya Biyalahichnykh Navuk., 1: 28-34 (Biol. Abstr. 48: 40382, 1967).

Wort, D.J. 1969. Stimulation of vegetative and productive growth of bush bean plants by naphthenates. Can. J. Pl. Sci., 49: 791-796.

Wort, D.J. and K.M. Patel. 1970 a. Erhohung des Buchbhonenertrages durchs Naphthenate and die Auswirkungen der Anwendungsmethode. Angew. Botanik, 144: 179-185.

Wort, D.J. and K.M. Patel, 1970 b. Response of plants to naphthenic and cycloalkanecarboxylic acid. Agr. J., 62: 644-646.