

PESTICIDAL EFFECTS ON NODULATION AND N-FIXATION IN GROUNDNUT (*Arachis hypogaea L*) C.V.SB- 11

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Abstract. Application of pesticide compounds to soil affected the germination, shoot and root growth, nodulation and N- content in different ways. 2,4-D completely inhibited seed germination at 1500 µg/ml. In streptomycin, Aureofungin, Thiram, Carbofunran, Thiodan, Hexacap, Difolatan and Calixin less than 50% germination was observed. In case of RH-124 and Calixin seeds were germinated but did not survive after 30 days at 1500 µg/ml and 80 µg/ml respectively. In Dithane Z-78, Ceresan, Dithane M-45, Blitox, Blitane, Brassicol, Topsin-M, RH-124, Bavistin, Disystan, Dasanit and Hexafeb 50-90% seed germination was observed. Rovral give 100% germination. Shoot length was stimulated by Bavistin, Blitox, Brassicol, Ceresan, Dithane Z-78, Hexacap and Disystan while it was inhibited by other compounds. Similarly stimulation of nodule formation was seen in Bavistin, Blitox, Brassicol, Ceresan, Rovral and Thiram. Consequently increased due to these compounds. Difolatan, Hexafeb, Thiram and Dasanit, however, delayed flowering period.

Keywords: Groundnut, Pesticides, N-fixation, germination

1. Introduction

Pesticidal component both on stimulatory and inhibitory effect on plant have been reported by various workers (Wedding et al., 1956; Howard & Hortall, 1959; Wortt, 1959; Nattman and Koberts, 1962; Dimond, 1965; Grossam, 1968; Tweedy, 1969; Wood cock, 1971; Jaiswal et al., 1975; Ries, 1976; De Bertodi et al., 1978; Singh et al., 1979 and Tanwar & Mehrotra, 1981) at various concentrations. All of them attributed this to the altered physiology of plants. Benomyl has shown to possess cytokinin like activity (Delp & Klopping, 1968) similarly decrease in the yield, inhibition of photosynthesis, Respiration and senescence and slightly increase in chlorophyll content due to carboxin and oxycarboxin is known (Cartson, 1970). Higher concentration of compound used, in this study might have inhibited the germination. Kalkarlia and Mehrotra (1981) reported that fungicides like Ceresin, Difoltan, Brassicol & Benlate found to be toxic to nodulation, plant growth, grain yield & even germination was delayed. Tanwar et al (1981) also reported the delayed flowering in gram due to application of Benlate, Dinofoltan, Ceresan, Brasscol and Thiram to soil.

2. Materials and Method

The growth of groundnut plant was determined at various growth periods by measuring length of shoot and root, number of nodules per plant, size of the nodules, dry matter and nitrogen content of the dry matter of the plant. Estimation of nitrogen was done by microkjeldal technique.

Rhizobium was isolated on Yeast Manitol agar (YEM) from well developed nodule of groundnut growing in the field. The pesticidal compounds was incorporated in the YEM broth into which 0.1ml Rhizobium from 3 days old culture tubes was inoculated in the test tubes. The compounds in the tube adjusted to have final concentration 100, 500, 1000 and 1500 µg /ml in broth. The growth of the Rhizobium was observed as optical density at 650nm in a spectrophotometer after 72 hrs inoculation period. Broth with out pesticide compound serve as control.

3. Result and discussion

A total of 26 pesticide compounds were tested on Rhizobium isolated from Groundnut on agar plates. All compounds inhibited this bacterium in various degrees at different concentration. Higher concentration proved to be inhibitor. Inhibitory effect of pesticidal compounds on Rhizobium or nodulation has shown (Kecsken and Vincent, 1969; Audus, 1970; Anderson, 1978; Gangawane et al., 1979). However nodulation in the soil was stimulated by certain compounds like Bavistin, Blitox, Brassicol etc. including that the effect *in vitro* and *in situ* are different, Byrde and Richmond (1976) also stated that activity of a fungicide *in vitro* does not always reflect its effectiveness *in vivo*. Application of pesticide compounds to soil affected the germination, shoot and root growth, nodulation, and nitrogen content in different ways. 2,4-D completely inhibited the seed germination at 1500 µg/ml. In Streptocyclin, Aureofungin, Thiram, Carbofuron, Thiodan, Hexacarp, Difoltan & Calxin less than 50% germination was observed. In concentration of RH-124 & Calxin seed were germinated but did not survive after 30 days at 1500 µg/ml and 80 µg/ml respectively. In Dithene Z-78, Ceresan, Dithen M-45, Blitox, Brassicol, Topsin-M, RH-124, Bavistin, Disystan, Dasanit and Hexacarp 50-90% seed germination. Shoot length was stimulated by Bavistin, Blitox, Brassicol, Ceresan, Dithane Z-78, Hexacarp and Disystan while it was inhibited by other compounds. Similarly, stimulation of nodulation was seen in Bavistin, Blitox, Brassicol, Ceresan, Rovral and Thiram. Consequently nitrogen content of the plants was also found to be increased due these compounds. Difoltan, Hexaferb, Thiram and Dasanit delayed flowering period.

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5. References

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