P: ISSN No. 0976-8602 RNI No.UPENG/2012/4262 VOL.-8, ISSUE-2 (Part-1) April 2019

E: ISSN No. 2349-9443 Asian Resonance

Analysis of Phytomorphological Characters of Faba Beans Treated With Pesticides (Phorate)

Naina Srivastava
Assistant Professor,
Dept. of Botany,
D.A.V. College,
Dehradun, Uttarakhand, India

Abstract

Increasing use of agricultural pesticides for improving field crops and for increasing food supply is expected to continue in the future. Humans are exposed to varieties of mutagens carcinogens and clastogens of agriculture and industrial origin. Therefore, it is important to know the relative degree of genotoxic potencies of essential environmental pollutants. The study also demonstrates the effects of phorate on seed germination, seedling growth, morphological characters (plant height (cm), number of branches per plant ,number of pods per plant , length of pods (cm), number of seed per pod, leaf length (cm), seed weight (gm) and the number of branches), The seeds treated with Phorate at 150, 300, 550, 800ppm for 8h germination percentage were 90.15%, 80.25% , 65.95%, 64.6% respectively.

Keywords: Pesticides, Phorate, Morphological Characters.

Introduction

Farmers by coincidence used pesticide every year. Studies on pesticides have proved that these can cause cancer. Cytotoxic effects due to exposure of pesticides has become a major concern to health because pesticides are broadly use in the agriculture. Many chemicals which are used for insect and weed, control and measured environmental mutagens and pollutants. Among the most widely used insecticides, some are also economically important organophosphorus and organochlorine insecticides. Majority insecticides have great impact on ecosystem because of their persistence in the environment. Bakala is commonly known as Faba bean or Broad bean. Faba bean (*Vicia faba* L.) is a legume crop grown primarily for its edible seeds (beans). Faba bean is a major legumeseed consumed by humans worldwide. The seeds of some varieties are an important livestock feed. Faba bean is also grown for fodder. *Vicia faba* is an upright annual forage legume. Faba bean is a multipurpose crop used for both food and fodder. Faba bean is a much delicious food legume in the Mediterranean region, China and Ethiopia.

Review of Literature

Faba beans used by human being after premature harvesting. In India it is popularly known as Kala Matar and Bakala as well (Singh *et al.,* 2012a; Singh *et al.,* 2013). The dried seeds are cooked, canned or frozen. Mature seeds are roasted snacks eaten in India or ground to prepare various food ingredients such as meet extenders or skim- milks replacers. Up to 100% losses have been reported in various legume crops in Asia and Africa in case of the conditions that favor diseases and pests (Vijay et al., 2015). Nitrogen fixation results in reduced input costs, less environmental pollution from nitrates leaching through the soil and improved soil fertility for future crops (Lupwayi and Soon 2016).

Aim of the Study

The study also demonstrates the effects of phorate on seed germination, seedling growth, morphological characters (plant height (cm), number of branches per plant ,number of pods per plant , length of pods (cm), number of seed per pod, leaf length (cm), seed weight (gm) and the number of branches), The seeds treated with Phorate at 150, 300, 550, 800ppm for 8h germination percentage were 90.15%, 80.25% , 65.95%, 64.6% respective The seeds treated with various concentrations of phorate showed rapid damage to the meristematic cells caused reduction in growth such as stem height, seedling growth, seed weight. The phorate affects the germination rate significantly at higher concentrations.

Materials and Methods

The materials treated with phorate were grown in experimental plots as well as in pots and the growth performances were observed and recorded. It was observed that in the treated plants the growth rate was very slow from germination to maturity, whereas the growth rate was normal in control .A brief description of variation in certain quantitative characters is given. The seeds treated with various concentrations of phorate showed rapid damage to the meristematic cells caused reduction in growth such as stem height, seedling growth, seed weight. The phorate affects the germination rate significantly at higher concentrations. In general the phorate treatments decrease the germination rate whereas other concentration of phorate solution showed the decrease in germination at higher concentration but not significantly. Final height of plant was recorded a week before harvesting, when the plant is supposed to have attained maximum height.

Seeds Treatment

The seeds of *Vicia faba* (local varieties) were cleaned by 0.5% sodium hydrochlorite solution for 5 minutes, thoroughly washed and soaked in distilled water for 24hrs and thereafter treated with chemical solutions of different test concentrations prepared .The solutions of both were made in the following concentrations on a.i. basis (1)0 ppm (control), (2)150ppm, (3)300ppm, (4)550ppmand (5)800ppm that were test concentrations/solutions.

Seed coats were removed gently and seeds were spread in petridishes containing cotton beds moistened with test concentrations (150, 300, 350 and 800 ppm). For each concentration three sets were used and each petridish had about 25 seeds for 4, 6, 8 hrs but maximum reading was taken in 8hrs. A set of 25 seeds was treated with tap water containing 0.25% DMSO for negative control.

The Plants of *Vicia Faba* Varieties Raised In Field/Pots

The untreated and treated seeds of *Vicia faba* varieties were sown in the field/ experimental plots as well as in the pots to study the growth performance at the outset. The experimental materials used in the present study were grown in the experimental plots in the Randomised Block Design with three replications in the Rabi season. The seed treatments were done in order to assess the suitability and impact on the growth and morphological behavior. Samples were collected and observations on *Vicia faba* varieties were made.

Germination and Seedling Height

Morphological characters, germination percentage and seedling height and other characters were determined. Three sets of 25 seeds in each treatment were germinated at 20°C in three replications on wet blotting paper in petridishes. The data for germination were taken on 5th day and seedling height was measured (Srivastava and Singh 2009).

Morphological Studies

The observations were made on the morphological characters representing germination percentage ,seedling height and other morphological characters (plant height(cm), number of pods per plant , number of seed per pod, leaf length (cm),seed weight(gm) and the number of branches) were analysed in case of treated and untreated seeds both. For morphological variation of two different varieties seed were treated with chemical.

Statistical Analysis

The analysis is regarding the comparision of more than two treatment means for small samples. It has been performed with the help of Microsoft MS Excel and Statgraphics software. The averages and standard deviations for different samples under consideration have been calculated with the help of MS Excel whereas Mean Squared Error (MSE) has been determined by the Statgraphics software under the comparision of multiple means, which is perpormed in ANNOVA for one way classification. Then the Standard Error has been determined. Finally we have calculated the critical differences with the help of MS Excel From the above results we conclude whether the treatments under comparision are equally good or not. The effect of any two treatments is treated as significant if the critical difference for them exceeds from the above values at given levels of significance.

Result and Discussion

Germination Percentage

The seeds treated with Phorate at 150, 300, 550, 800ppm for 8h were 90.15%, 80.25% , 65.95%, 64.6% respectively.(TABLE.1)

Seedling Height

Seedling Height was recorded after treatment with phorate for all concentration for 8hrs was 3.93, 3.81, 3.72, 3.45cm.(TABLE2.)

Morphological Characters

At 150,300,550, 800 ppm for 8,hrsplant height(cm), number of branches per plant ,number of pods per plant , length of pods number of seed per pod, leaf length (cm),seed weight(gm) and the number of branches showed reducing effect. Plant height (cm) was reduced after treatment of phorate was 52.65, 59.43 ,47.54 ,48.73 in cm. ,Number of branches per plant also observed after treatment that was 3.7, 3.7, 3.8 ,3.6 ,.Number of pods per plant was changed after treatment that was 6.74, 6.83, 6.74, 6.98 in all four concentration for 8hrs. Reducing effects of phorate on length of pods after treatments 6.5, 6.4, 6.7, 6.3, cm, Number of seeds after treatment in all four concentrations were 6.1,6.4,6.7,6.3. Leaf length in cm observed in all concentration was 7.1, 7.7, 7.9, 7.8 in cm, 100 seeds weight in gm. after treatment was 57.1. ,59.5, 58.7, 59.2 gm for all concentrations at 8hrs exposure. Number of seeds after treatment in all four concentrations were 6.1,6.4,6.7,6.3.Leaf length in cm observed in all concentration was 7.1, 7.7, 7.9, 7.8 in cm,100 seeds weight in gm. after treatment was 57.1. ,59.5, 58.7, 59.2 gm for all concentrations at 8hrs exposure. Plant height (cm) was reduced after treatment of phorate was 52.65, 59.43 ,47.54 ,48.73 in cm. ,Number of branches per plant also observed after treatment that was 3.7, 3.7, 3.8 ,3.6 ,.Number of pods per plant was changed after treatment that was 6.74, 6.83, 6.74, 6.98 in all four concentration for 8hrs. Reducing effects of phorate on length of pods after treatments 6.5, 6.4, 6.7, 6.3, cm (Table 3).

Table-1

Effects of Insecticide and Fungicide on Seed Germination of Faba Bean (*Vicia Faba)* (Kanpur local variety) After 8h Exposure.

Chemicals	Concentration (Ppm)	Germination (%)
Control	0	97.35
Phorate	150	90.15
	300	80.25
	550	65.95
	800	64.65
Mean		**75.25**
SD		**12.191**

Table 2

Effects of Insecticide and Fungicide on Seedling Height of Faba Bean (*Vicia Faba)* (Kanpur local variety) after 8h Exposure

Chemicals	Concentration (ppm)	Seedling Height (cm)
Control		4.81
Phorate	150	3.93
	300	3.81
	550	3.72
	800	3.45
Mean		3.72
SD		0.11

Table-3; Effects of Phorate on Morphological Character of Faba Bean (*Vicia Faba)* (Kanpur Local Variety) After 8h Exposure

Chemicals	Concentration (ppm)	Plant height (cm)	Number of branches per plant	Number of pods per plant	Length of pod (cm)	Number of seed per pod.	Leaf length (cm).	100 seed weight (g).
Control	0	55.20	3.7	6.53	6.3	6.2	7.6	58.6
Phorate	150	52.65	3.7	6.74	6.5	6.1	7.1	57.1
	300	59.43	3.7	6.83	6.4	6.4	7.7	59.5
	550	47.54	3.8	6.74	6.7	6.9	7.9	58.7
	800	48.73	3.6	6.98	6.3	6.5	7.8	59.2
Mean		**52.09**	**3.70**	**6.82**	**6.48**	**6.48**	**7.63**	**58.63**
SD		5.360	0.082	0.113	0.171	0.330	0.359	1.069

References

Asthana, M., Kumar, A.(2014). Dose Response of Viola odorata on Meiotic and Mitotic Chromosomes of Vicia faba. British J Pharm. Res. 4(4): 520-530.

Andrade, L.F., Davide, L.C., Gedraite, L. S. (2010):The effect of cyanide compounds, fluorides, aluminum, and inorganic oxides present in spent pot liner on germination and root tip cells of Lactuca sativa. Ecotoxicology and Environmental Safety, 73:626–631.

Assadollahi, V., Parivar, K., Roudbari, N. H.,Khalatbary, A. R., Motamedi, M., Ezatpour, B.and Dashti, G. R. (2013). The effect of aqueous cinnamon extract on the apoptotic process in acute myeloid leukemia HL-60 cells. Adv. Biomed. Res.,2013 6(2): 25-

Ananthakrishanan, M., K. A.S. Antony, 2013. Genotoxic effects of furadan and f and enodosulphan on (Allium cepa) root tips. Asian Journal of Pharmaceutical and Clinical Research, 6(1):126-131.

Asita, A.O., Mokhobo, M.M. (2013). Clastogenic and Cytotoxic Effects of Four Pesticides Used to Control Insect Pests of Stored Products on Root Meristems of Allium cepa. Environ. Nat. Resour. Res 3(2):133-145.

Coloma A.G., Reina M., Diaz C.E. and Fraga B.M., 2010 — Natural Prod uct-Based Biopesticides for Insect Control. Comprehensive Natural Products II, 2010, Chapter 3.09, Pages 237-268.

Fawzia, I., Mohamed, El-Ashry, Z.M. (2012). Cytogenetic effect of allelochemicals Brassica nigra L. extracts on Pisum sativum L. World Applied Sci. J. 20(3): 344-353.

Hassan, S., Mokiti, N. T. and Tarimo, P. A. 2013. Allelopathic effects of aqueous extract of Argemone mexicana L. on germination and growth of Brachiaria dictyoneura L. and Clitoria ternatea. Am. J. Plant Sci. 4: 2138–2147.

Haroun &. Abualghaith 2015, Evaluation of the Allelopathic Effect of Aqueous Extract of Zygophyllum simplex L. on Vicia faba L. Plants Cytologia 80(3): 363–371

*Ilbas, A. I., Gonen, U., Yilmaz, S. and Dadandi, M. Y. 2012. Cytotoxicity of Aloe vera gel extract on Allium cepa root tip cells. Turk. J. Bot. **36**: 263–268.*

Vijay P, Anil KC, Anchal D, Bana RS, Rana KS, Rana DS, Tyagi VK, Puniya MM (2015) Improved crop management practices for sustainable pulse production: an Indian perspective. Indian Journal Agricultural Sciences 85(6):747–758.

Lupwayi, N. Z., and Y. K. Soon. 2016. Nitrogen-related rotational effects of legume crops on three consecutive subsequent crops. Soil Sci. Soc. Amer. J. 80: 306–316.