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Effect Of Carbamine Insecticide On Productivity Of Sweet Pea (*Pisum sativum*)

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Abstract
The effect of carbamine insecticide on the productivity parameters of the *Pisum sativum* have been studied. The insecticide has decreased the photosynthetic pigments for all the concentrations. Nitrogen and protein content has initially decreased upto 14 days treatment period and has further increased during last 7 days. The soil nutrients (nitrate, sulphate & phosphate) have also decreased for all the concentration of the insecticide.

Keywords**:** *Pisum sativum*, *Carbamine*, *Chlorophyll, Nitrogen.*

Introduction
Now-a- days, the pressure on agricultural fields has increased to meet the demand of increasing population. Various measures are adopted in the field to increase the productivity. Insecticides are now commonly used to make the crop insect free and thereby increase in productivity. However, the use of insecticides causes negative impact on the field in long term. Different types of pesticides are applied based on their chemical nature and the pest targeted. Carbamine (carbaryl) is a wide-spectrum carbamate insecticide which controls over 100 species of insects on citrus, fruits, vegetables, cotton, forests, lawns, nuts, ornamentals, shade trees, and other crops, as well as on poultry, livestock and pets. It is also used as molluscicide or acaricide. Carbaryl works whether it is ingested into the stomach of the pest or absorbed through direct contact. The chemical name for carbaryl is 1-naphthol N-methylcarbamate (USEPA,1987). In the present study, the effect of carbamine on productivity parameters of *Pisum sativum* and soil nutrients is being studied.

Methodology
Four plots of 1x1mm^2 were prepared in the field. Seeds of *Pisum sativum* were sown in each plot. After 7days of sowing, treatment of different concentrations of carbamine (50 ppm, 100 & 200ppm) were given to different plots. One plot was kept as control treating with distilled water. pH, nitrate, sulphate and phosphate content of the soil and photosynthetic pigments, carbohydrate, %nitrogen & crude protein were initially estimated before giving the treatment. Sampling of the plants was done at the time interval of 7, 14 and 21 days after the treatment for analysis of productivity parameters and soil nutrients.
Chlorophyll-a, chlorophyll-b total chlorophyll and carotenoids were estimated according to methods of Tuba (1987b) and Well and Allan (1994). Total carbohydrate was determined by anthrone method of Hedge & Hofreiter (1962).% nitrogen and % Crude protein were estimated by kjeldhal method Jackson(1962). pH, nitrate, sulphate and phoshate content of the soil were measured by methods given by Saxena, (1989).

Results and Discussion
Results of effect of carbamine on photosynthetic pigments (chl-a,chl-b, total chlorophyll & carotenids) are shown in fig.1. In case of control & 50 ppm concentration , pigments has increased during & treatment period whereas, the higher insecticide concentration (100 & 200 ppm) shows reverse trend of decreasing chlorophyll contents with incresing treatment period. In total carbohydrate, similar trend has been observed (fig.2.) Kaa *et*

al. (2004) studied the effect of pre- emergently applied herbicide clomazone on the photosythetic apparatus of primary barley leaves (*Hordeum vulgare* L.) It was found that clomazone application caused a reduction in chlorophyll (a+b) and carotenoid levels that was accompanied by a decline in the content of light harvesting complexes as judged from the increasing chlorophyll a/b ratio. The decrease in the chlorophyll content has been suggested to caused by a suppressed number of the electron transport chains in the thylakoid membranes or by their decreased functionality. However, a different trend has been found in % N_2 and crude protein content of the plant (fig.3.) In case of control, % N_2 and crude protein has increased upto 21 days % N_2 and crude protein has decreased utpo 14 days for all the concentrations of the insecticide and after that the contents has increased during the last 7 days duration. Although the increase is small as compared to the initial % N_2 and crude protein content measured before treatment. Khan *et al.* (2004) studied the influence of herbicides on Chick pea. It was found that on applying ten times the recommended rates of all herbicides adversely affected the plant vigor, total chlorophyll content and nitrogen (N) content in shoot and seed production. The increase in the nitrogen content and crude protein may be of two factors- firstly the plant has the capability to fix the atmospheric nitrogen in the root nodules and secondly corbaryl has a short residual life of two weeks on treated crops. The insecticide remains at the application , site, where it is slowly taken into the plant and metabolized. Insecticidal properties are retained for 3-10 days. Loss of carbary is due to evaporation and uptake into plant. Breakdown by sunlight does not appear to be significant (Wauchope, 1978).pH of soil has decreased in control upto 21 days. The insecticide treatment (50 ppm) has also decreased the pH upto 14 days period and further the pH has increased whereas, the higher insecticide concentration has increased the pH during the observation period (fig.4). Many common insecticides and miticides are susceptible to breakdown if the pH is greater than 7. The process of alkaline hydrolysis in which the alkaline water breaks apart insecticide or miticide molecules thereby increasing the pH further then reassemble with other ions. These new combinations may not have any insecticidal or miticidal properties in general, the carbamate (for example, carbamine) and organophosphate (for example, Dursban) chemical classes are more susceptible than chlorinated hydrocarbons (for example, Lindane) or pyrethroids (for example, Tastar) (Druse,2001). In case of soil nutrients (NO_3, SO_4 & PO_4), the insecticide has shown a negative impact thereby decreasing the sulphate and phosphate during the treatment period (fig.5.). the consumption of the soil nutrients by the plant also contributes towards the reduction of nutrients.

References

Druse, K. 2001: *Horticulture & Gardening shoots*. In: Making more plant. Uni. Of Illinos Extension- Peoria Country.

Hedge, J.E. & Horfreither, R.D. 1962 : *In Carbohydrate Chemistry* 17 (ed.) Whister R.L. and Be Miller, J.N. Academic Press, New York.

Jockson, M.L. 1962 : Soil chemical analysis, Prentice Hall, Inc. England.

Kaa, R., Pundova, M., Ilik, P., Larar, D., Klem, K.,Tomek, P., Nau, J. and Paril, O. 2004 : Effect of herbicide clomazone on photosynthetic process in primary barley (*Hordeum vulgare L.*) leaves. ***Pesticide Biochemistry & Physiology***. Vol. 78(3): 161-170.

Khan, M.S., Zaidi, A. and Aamil, M. 2004 : Influence of herbicides on Chick pea Mesorhizobium symbiosis. ***Agronomire***. Vol.1.24 123-127.

Tuba, Z. 1987 : *Method for determination of the entire photosynthetic pigment composition of bryophytes.* In: H. Rudolph and E. Hartman (ed). Abstract Bryological Methods Workshop: 118-119.

U.S. *Environmental Protection Agency*, Office of Drinking Water. Carbary1 Health Advisory. Draft Report. August 1987.

Wauchope, R.D. 1978. ***J. Environ. Qual.*** 7:459-472.

Well Burn and Allan, R. 1994 : The spectral determination of chlorophyll `a` and `b` using various solvents with Spectrophotometers of different resolution . ***Plant. Physiol.*** 144:307-313.

Saxena, M.M. 1989: *Water. Air & soil Analysis*. Agra Botanical Publishers India.

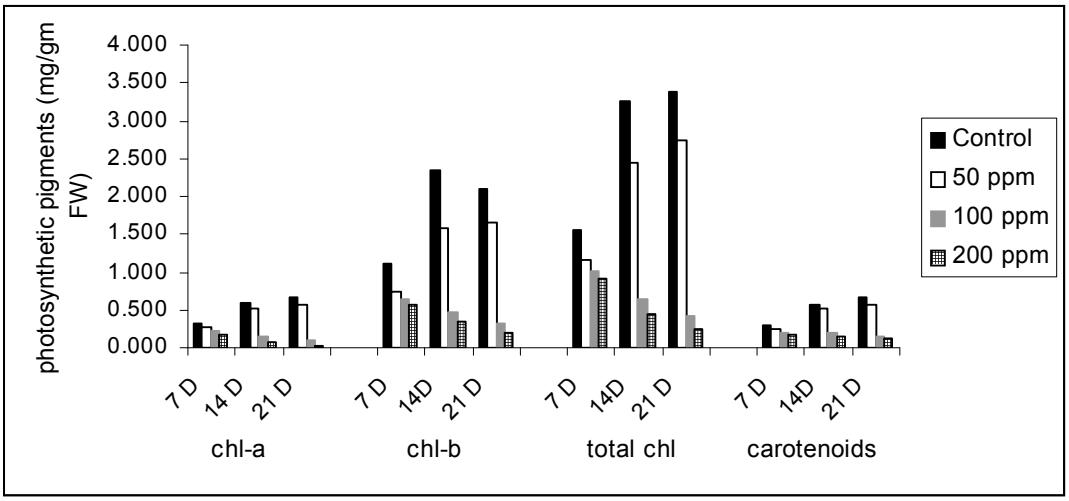

Fig.1. : Effect of different concentrations of carbamine on chl-a, chl-b, total chlorophyll & carotenoids (mg/ gm FW) of the *Pisum sativum* during different treatment periods.

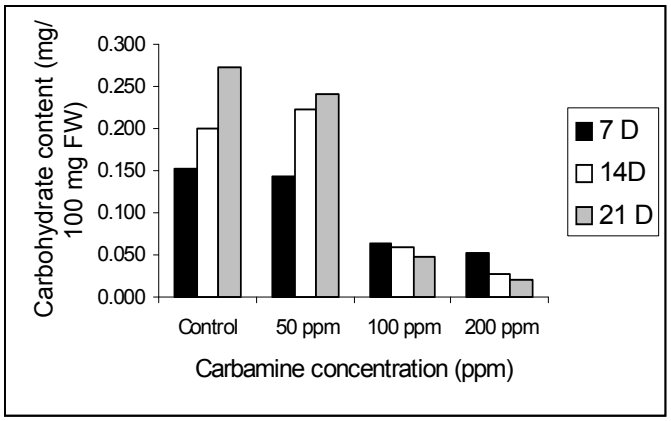

Fig.2. : Effect of different concentrations of carbamine on carbohydrate content (mg/ 100mg FW) of the *Pisum sativum* during different treatment periods.

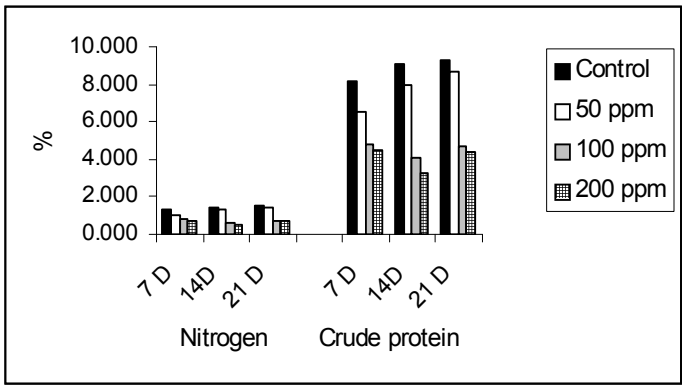

Fig.3. : Effect of different concentrations of carbamine on % nitrogen & % crude protein content of the *Pisum sativum* during different treatment periods.

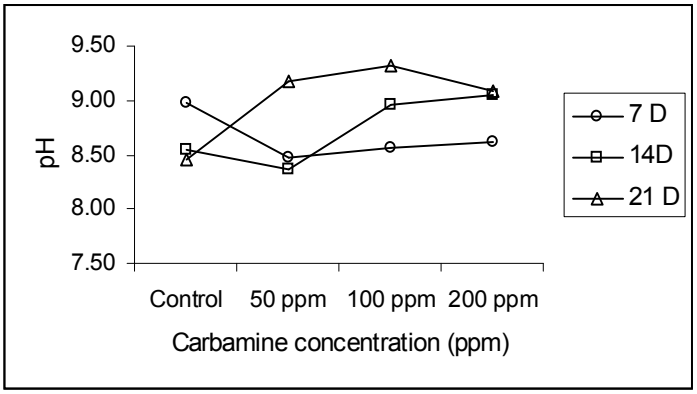

Fig.4. : Effect of different concentrations of carbamine on soil pH during different treatment periods.

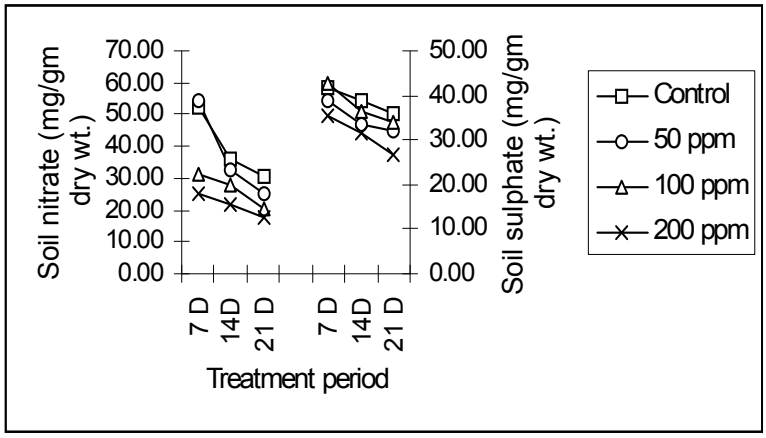

Fig.5. : Effect of different concentrations of carbamine on soil nitrate and soil sulphate (mg/ gm dry wt.) during different treatment periods.

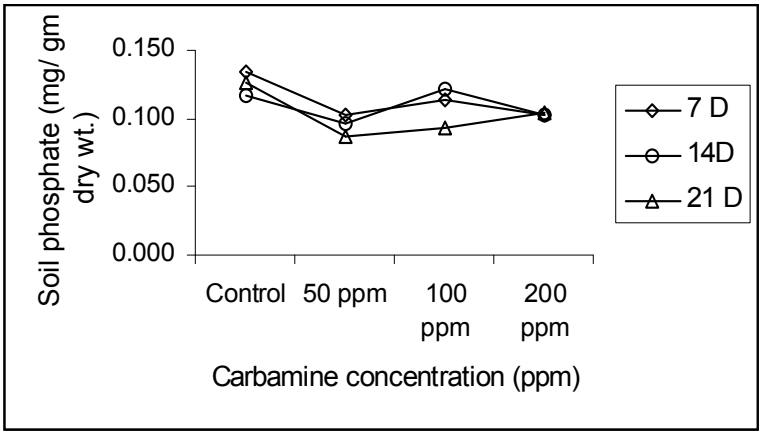

Fig.6. : Effect of different concentrations of carbamine on soil phosphate (mg/ gm dry wt.) during different treatment periods.