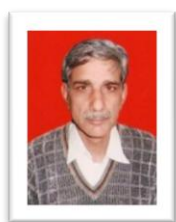


Effects of Various Concentrations of Rogor and nuvan on Chlorophyll and Protein Content of *Vigna Radiata* Seedling



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Abstract

The pesticides affect chlorophyll and protein contents of leguminous crop plants. Quantitative analysis of chlorophyll and protein gives an idea of photosynthesis capacities in the plants and nitrogen content of the plants. Therefore, for the present study, these two biochemical parameters i.e. Chlorophyll content and protein content of *Vigna radiata* were quantitatively analyzed in various increasing concentrations of rogor and nuvan.

For chlorophyll and protein estimation, the seedlings of *Vigna radiata* were harvested on third sampling stage. The plant tissues were weighed and analyzed for these parameters on mg/g fresh weight basis. Chlorophyll content was estimated by extracting in 80% acetone and determined spectrophotometrically following the procedure of Arnon (1949). The protein content was also estimated spectrophotometrically by the method of Bradford (1976).

It has been observed that very less effect on chlorophyll and protein content of *Vigna radiata* was seen at low concentration (0.5%) of both the pesticides – rogor and nuvan. It can thus be concluded that when the concentration of pesticides was increased, then both chlorophyll and protein content continuously decreased with increasing concentration. No results were obtained for 10.0% concentration. The reason for decrease in chloroplast pigments and protein contents may be due to certain metabolic reasons.

Keywords: Vigna, Chlorophyll, Rogor, Nuvan.

Introduction

Photosynthesis is the only process of the universe, which provides food to all organisms and carried out by the plants with the help of chloroplastic pigments in the presence of light using carbon dioxide and water as raw materials. Chlorophyll being the main pigment of this process may be taken as a parameter of photosynthetic capacity of the plants.

Proteins are the macromolecules and being the building blocks of body are necessary for the growth of an organism. Proteins play important roles in plants structurally and metabolically. Plants in stress conditions use many proteins with specific amino-acid combination also. Legumes, especially pulses are good source of proteins to human beings.

The pesticides affect chlorophyll and protein contents of leguminous crop plants. Quantitative analysis of chlorophyll and protein gives an idea of photosynthesis capacities in the plants and nitrogen content of the plants. Therefore, for the present study, these two biochemical parameters of selected plants were quantitatively analyzed.

Aim of the Study

The aim of current studies is to find the effects of rogor and nuvan on chlorophyll and protein content of *Vigna radiata*.

Review of Literature

Vajpai, P., Tripathi, R. D., Rai, U. N., Ali, M. B. and Singh, S. N. in the year 2000 analyzed Chromium (V₂) photosynthetic rate of *Vigna radiata* L. studied Wilezek Seedlings. Pandey GC, Neraiya S in 2002 studied Distillery effluent induced alterations on the seed germination, seedling growth, chlorophyll and protein contents of Bengal gram *Cicerarietinum* Kannabrian, B. and Pragasam, A. (1993), Effect of distillery effluent on seed germination, seedling growth and pigment content of *Vigna mungo* (L.).

Materials and Methods

For chlorophyll and protein estimation, the seedlings were harvested on third sampling stage. The plant tissues were weighed and analyzed for these parameters on mg/g fresh weight basis. Chlorophyll content was estimated by extracting in 80% acetone and determined spectrophotometrically following the procedure of Arnon (1949). The protein content was also estimated spectrophotometrically by the method of Bradford (1976)

Results and Discussion

The results of the effect of different concentrations of two pesticides – rogor and nuvan on *Vigna radiata* are shown in table 1,2, and fig 1,2,3,4,5,6,7,8. It is evident from the data that the chlorophyll contents decreased with increasing concentration of pesticides; however, very less effect was seen in low concentration, i.e., 0.5%. No results were obtained at high concentration, i.e., 10.0% and above. Along with total chlorophyll contents, chlorophyll a and chlorophyll b contents were also recorded for the same sample. These parameters also showed the same trends with different concentrations of pesticides in both the crops. Protein content was also analyzed in the seedling of these two crops. The protein contents in all the samples showed similar trends as chlorophyll.

The results of sample I, for effect of rogor on *Vigna radiata* are shown in table 1 and figure 1, 2,3,4. The data showed that the Ch a (fig. 1) content are 0.987 mg/g for control and 0.986, 0.895, 0.813, 0.742, 0.660, 0.542 mg/g, and 0.321 mg/g respectively for increasing concentrations of pesticide. The chlorophyll b contents (fig. 2) was 0.548 mg/g for control and 0.516, 0.466, 0.377 mg/g, and 0.312, 0.220, 0.152 mg/g, and 0.103 mg/g respectively for increasing concentrations of pesticide. The total chlorophyll content (3) was 1.66 mg/g for control and 1.65, 1.49, 1.35 mg/g, and 1.21, 1.08, 0.88 mg/g, and 0.51 mg/g fresh weight of plant tissue for respective concentrations of pesticide. The protein content in control plant was 28.45 mg/g fresh weight as compared to 28.42, 24.46, 22.95 mg/g, and 19.75, 14.6, 11.47 mg/g, and 9.54 mg/g respectively for increasing concentrations of rogor, i.e., 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5%. No results were obtained for 10.0% pesticide concentration.

The results of *Vigna radiata* sample II are shown in table 2 and fig1,2,3, and 4. The data showed that chlorophyll a contents were 0.987, 0.986, 0.895 mg/g, and 0.813, 0.742, 0.660; 0.542 mg/g, and 0.321 mg/g, chlorophyll b contents were 0.94, 0.93, 0.894 mg/g, and 0.83, 0.69, 0.59 mg/g, and 0.53, 0.322 mg/g fresh weight of leaves respectively in control and increasing concentrations of pesticide. The total chlorophyll contents were 1.64, 1.63, 1.48 mg/g, and 1.34, 1.23, 1.07, 0.89, 0.54 mg/g respectively for above samples. The total protein contents were 27.40, 27.20, 23.41 mg/g, and 23.10, 18.50, 13.90 mg/g, and 11.40, 9.45 mg/g fresh weight of leaf tissue for increasing concentration of rogor, i.e., 0.0%, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0% and 7.5% respectively. No results were obtained for 10.0% pesticide concentration.

The results of effect of nuvan on *Vigna radiata* sample I are shown in table 3, and fig. 5,6,7,8. As per the observations chlorophyll a contents were 0.930, 0.922, 0.895 mg/g, and 0.830, 0.750, 0.640, 0.570 mg/g and 0.324 mg/g fresh weight of leaf tissue in control and respective concentrations. The chlorophyll b contents were 0.560, 0.550, 0.468 mg/g, 0.390, 0.340, 0.210, 0.150 mg/g and 0.104 mg/g fresh weight of leaf tissue for control and increasing concentrations of pesticide respectively. The total chlorophyll contents were 1.69, 1.68, 1.47 mg/g, and 1.34, 1.24, 1.06 mg/g, and 0.87, 0.52 mg/g fresh weight in respective samples as above.

The total protein content were 29.40, 29.30, 23.47 mg/g, and 22.10, 19.70, 13.50 mg/g, and 10.9, 9.56 mg/g fresh weight of tissue for increasing concentrations of nuvan, i.e., 0.0%, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% respectively. No results were obtained for 10.0% concentration.

The results shown in table 4 and figure 5,6,7,8 are for effect of nuvan on *Vigna radiata* sample II. The results showed that chlorophyll 'a' contents were 0.940, 0.930, 0.894 mg/g, and 0.820, 0.730, 0.670 mg/g, and 0.560, 0.330 mg/g fresh weight of leaf tissue while chlorophyll 'b' contents were 0.510, 0.500, 0.461 mg/g, and 0.370, 0.340, 0.250 mg/g, and 0.170 and 0.106 mg/g respectively in control and treated plants. The total chlorophyll contents were 1.67, 1.66, 1.48 mg/g, and 1.32, 1.22, 1.07 mg/g, and 0.89, 0.56 mg/g fresh weight of tissue and total protein contents were 27.60, 27.50, 24.58 mg/g, and 22.01, 19.45, 16.30 mg/g, and 12.00, 0.51 mg/g fresh weight of tissue for increasing concentrations of nuvan, i.e., 0.0%, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% respectively. No results were obtained for 10.0% concentration.

Conclusion

On the basis of present studies, it is concluded that in both the crops, chlorophyll 'a', chlorophyll 'b', total chlorophyll and total protein contents decreased with increasing concentration of pesticides, i.e., 0.0%, 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0% and 7.5% and at 10.0% concentration, no results were obtained. Thus, higher concentrations of pesticides are detrimental to these legumes.

Reference

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Table 1 Effects of Various Concentrations of Rogor on Chlorophyll and Protein content of *Vigna radiata* seedling (Sample I)

Attributes	Various concentration of pesticide								
	0.0 %	0.5 %	1.0 %	1.5 %	2.0 %	2.5 %	5.0 %	7.5 %	10.0 %
Chlorophyll a	0.987 ±0.06	0.986 ±0.05	0.895 ±0.08	0.813 ±0.06	0.742 ±0.03	0.660 ±0.01	0.540 ±0.02	0.321 ±0.02	0.00
Chlorophyll b	0.548 ±0.08	0.516 ±0.07	0.466 ±0.07	0.377 ±0.05	0.312 ±0.06	0.220 ±0.04	0.150 ±0.02	0.103 ±0.01	0.00
Total Chlorophyll	1.664 ±0.13	1.650 ±0.15	1.490 ±0.13	1.350 ±0.12	1.210 ±0.11	1.080 ±0.10	0.880 ±0.11	0.510 ±0.12	0.00
Protein	28.45 ±2.23	28.42 ±2.23	24.46 ±1.53	22.95 ±1.25	19.75 ±1.18	14.6 ±1.16	11.5 ±1.14	9.54 ±	0.00

Table 2 Effects of Various Concentrations of Rogor on Chlorophyll and Protein content of *Vigna radiata* seedling (Sample II)

Attributes	Various concentration of pesticide								
	0.0 %	0.5 %	1.0 %	1.5 %	2.0 %	2.5 %	5.0 %	7.5 %	10.0 %
Chlorophyll a	0.950 ±0.08	0.940 ±0.07	0.893 ±0.06	0.820 ±0.06	0.680 ±0.05	0.580 ±0.04	0.520 ±0.04	0.320 ±0.03	0.00
Chlorophyll b	0.940 ±0.08	0.930 ±0.08	0.894 ±0.07	0.830 ±0.06	0.690 ±0.05	0.590 ±0.04	0.530 ±0.04	0.322 ±0.02	0.00
Total Chlorophyll	1.64 ±0.13	1.63 ±0.13	1.48 ±0.11	1.34 ±0.10	1.23 ±0.09	1.07 ±0.05	0.89 ±0.04	0.54 ±0.04	0.00
Protein	27.40 ±2.17	27.20 ±1.16	23.41 ±1.92	23.10 ±1.80	18.50 ±1.05	13.90 ±1.03	11.40 ±1.03	9.45 ±1.00	0.00

Table 3 Effects of Various Concentrations of Nuvan on Chlorophyll and Protein content of *Vigna radiata* seedling (Sample I)

Attributes	Various concentration of pesticide								
	0.0 %	0.5 %	1.0 %	1.5 %	2.0 %	5.0 %	7.5 %	10.0 %	
Chlorophyll a	0.930 ±0.08	0.922 ±0.08	0.895 ±0.07	0.830 ±0.07	0.750 ±0.06	0.640 ±0.05	0.570 ±0.05	0.324 ±0.02	0.00
Chlorophyll b	0.560 ±0.03	0.550 ±0.02	0.468 ±0.03	0.390 ±0.02	0.340 ±0.02	0.210 ±0.03	0.150 ±0.04	0.104 ±0.03	0.00
Total Chlorophyll	1.69 ±0.14	1.68 ±0.13	1.47 ±0.15	1.34 ±0.14	1.24 ±0.12	1.06 ±0.15	0.87 ±0.14	0.52 ±0.13	0.00
Protein	29.40 ±2.18	29.30 ±2.15	23.47 ±1.25	22.10 ±1.26	19.70 ±1.05	13.50 ±0.09	10.90 ±1.11	9.56 ±0.98	0.00

Table 4 Effects of Various Concentrations of Nuvan on Chlorophyll and Protein content of *Vigna radiata* seedling, (Sample II)

Attributes	Various concentration of pesticide								
	0.0 %	0.5 %	1.0 %	1.5 %	2.0 %	2.5 %	5.0 %	7.5 %	10.0 %
Chlorophyll a	0.940 ±0.08	0.930 ±0.08	0.894 ±0.07	0.820 ±0.07	0.730 ±0.06	0.670 ±0.04	0.560 ±0.04	0.330 ±0.02	0.00
Chlorophyll b	0.510 ±0.05	0.500 ±0.06	0.461 ±0.03	0.370 ±0.02	0.340 ±0.02	0.250 ±0.02	0.170 ±0.01	0.106 ±0.01	0.00
Total Chlorophyll	1.67 ±0.17	1.66 ±0.12	1.48 ±0.13	1.32 ±0.11	1.22 ±0.11	1.07 ±0.09	0.89 ±0.08	0.56 ±0.06	0.00
Protein	27.60 ±2.14	27.50 ±2.53	24.58 ±2.18	22.01 ±1.89	19.45 ±1.56	16.30 ±1.11	12.00 ±1.04	9.51 ±0.03	0.00

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Figure 1 Effects of Various Concentrations of Rogor on Chlorophyll a of *Vigna radiata* seedling X axis Represent Conc of Pesticide And Y-Axis Represent Chlorophyll Content

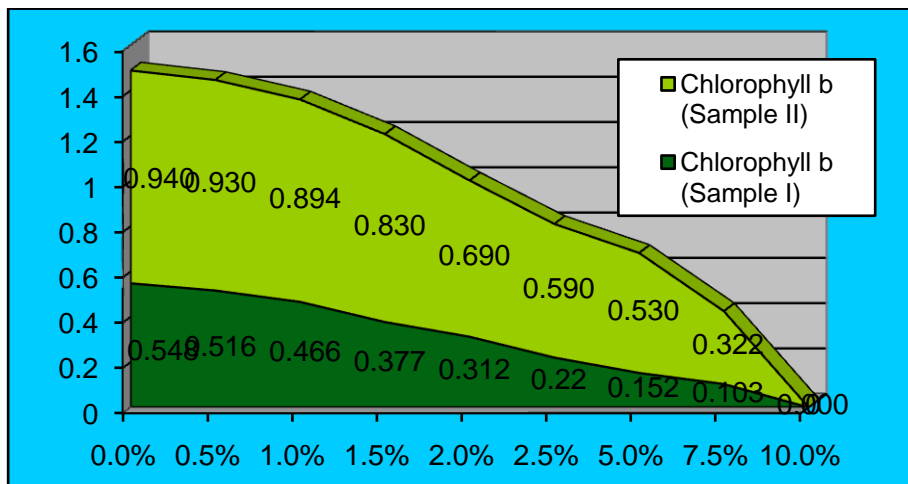


Figure 2 Effects of Various Concentrations of Rogor on Chlorophyll b of *Vigna Radiata* Seedling X Axis Represent Conc Of Pesticide And Y-Axis Represent Chlorophyll Content

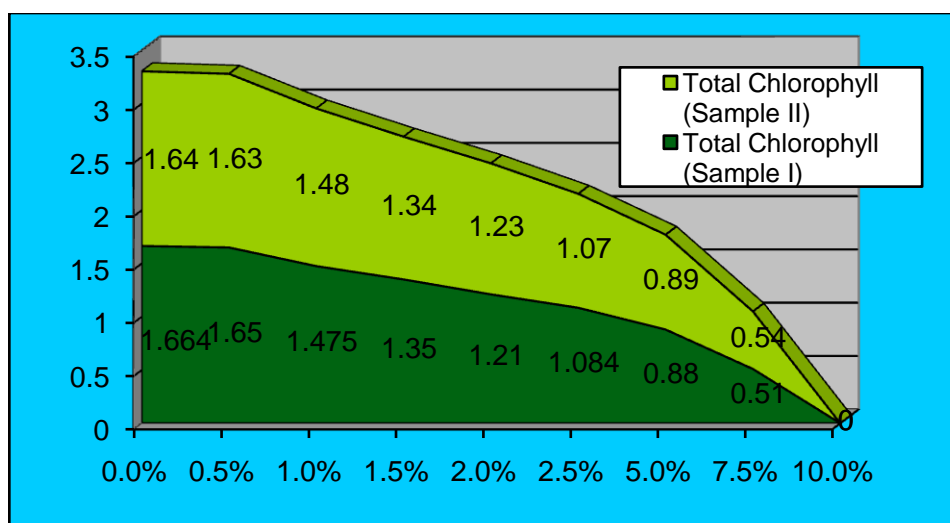


Figure 3 Effects of Various Concentrations of Rogor on Total Chlorophyll of *Vigna radiata* seedling

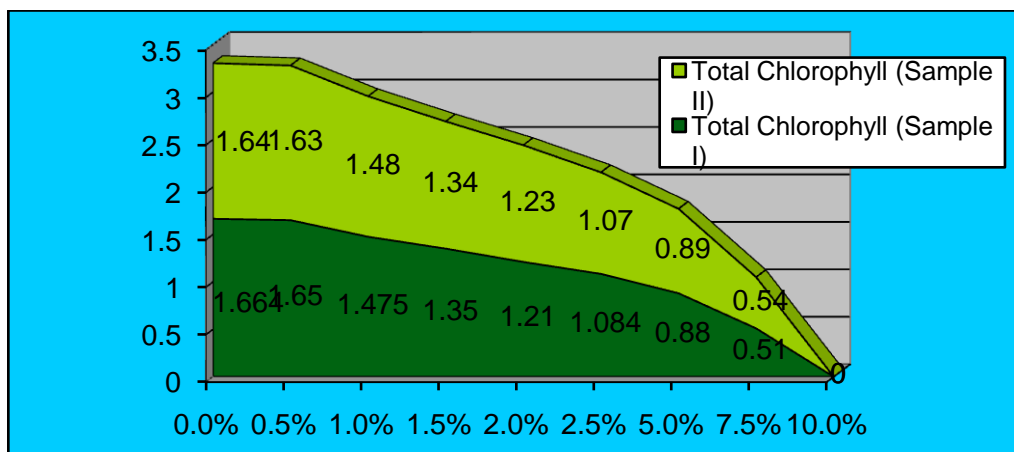


Figure 4 Effects of Various Concentrations of Rogor on Protein Contents of *Vigna radiata* seedling.

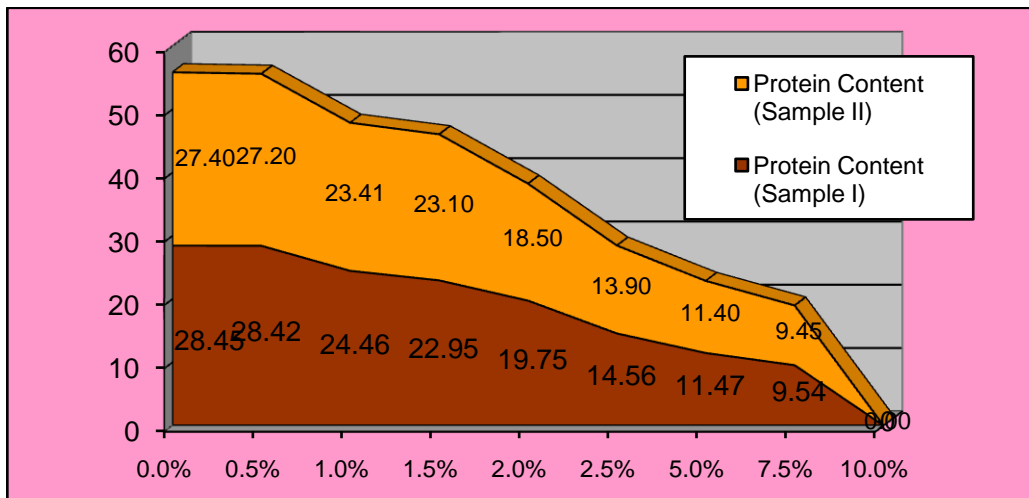


Figure 5 Effects of Various Concentrations of Nuvan on Chlorophyll a of *Vigna radiata* seedling, X axis represent concentration of pesticide and y-axis represent chlorophyll content.

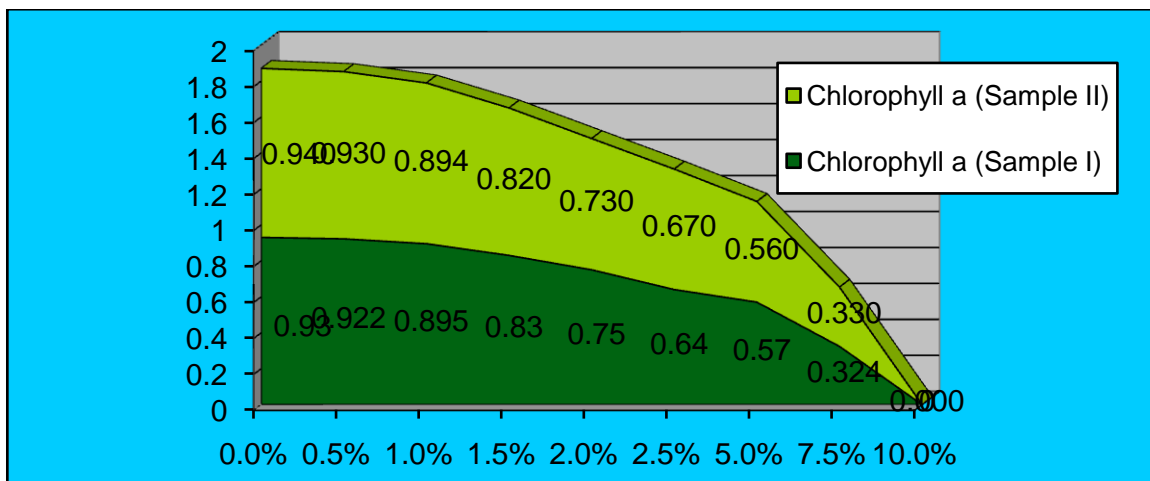


Figure 6 Effects of Various Concentrations of Nuvan on Chlorophyll b of *Vigna radiata* seedling, X axis represent concentration of pesticide and y-axis represent chlorophyll content.

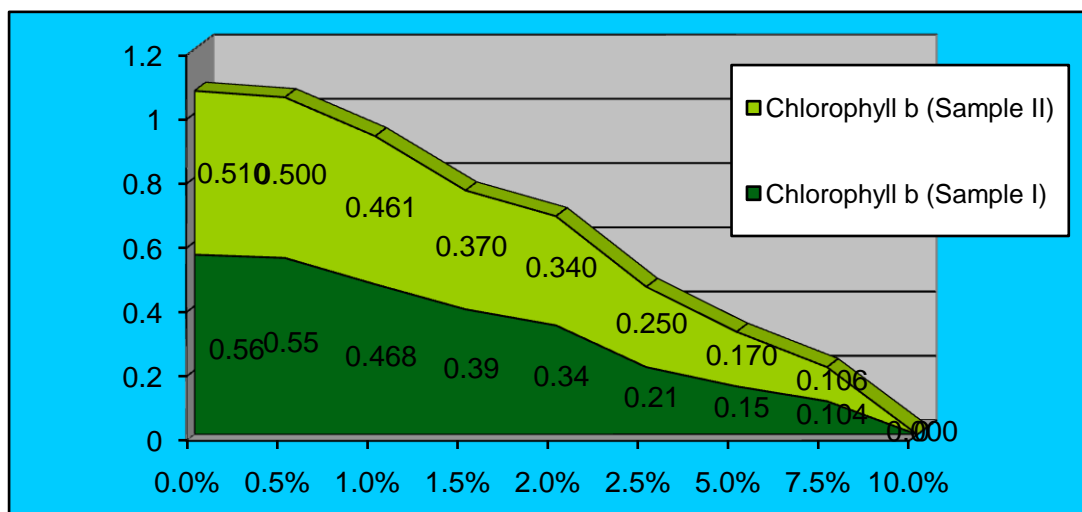


Figure 7. Effects of Various Concentrations of Nuvan on Total Chlorophyll of *Vigna radiata* Seedling

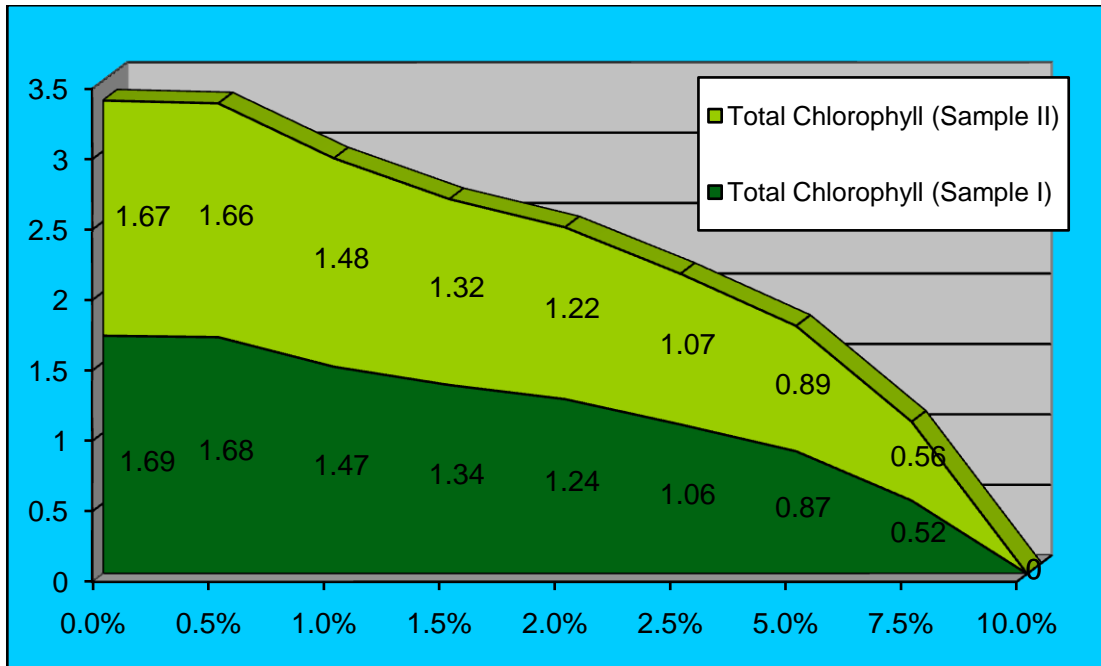


Figure 8. Effects of Various Concentrations of Nuvan on Protein Contents of *Vigna radiata* Seedling

