

Effect of Various Concentrations of Rogor and Nuvan on Leghaemoglobin Content of *Vigna Radiata* and *Vigna Mungo*



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Abstract

It is well established that leg-hemoglobin content is the measure of nitrogen fixation capacity of nodules of a particular plant in a particular environmental condition and for present study, the concentration for leg-hemoglobin was measured after treating the plants with different concentrations of rogor and nuvan. The concentration of leg-hemoglobin decreased upon increasing the concentration of the pesticides and finally at 10% pesticide concentration no results were obtained. From the current studies it can be concluded that *Vigna radiata* and *Vigna mungo* show good concentration of leg-hemoglobin at low pesticide concentration and at high concentration the leg-hemoglobin concentration decreases.

Keywords: Vigna, Leg-Hemoglobin, Rogor, Nuvan.

Introduction

Leghaemoglobin is a pink coloured biliprotein which is synthesized in leguminous root nodules due to interaction between root cell and nitrogen fixing bacteroid. Leghaemoglobin (Lb) consists of heme part synthesized by the bacteroid and globin part synthesized by the legumes. There is direct correlation between leghaemoglobin and nitrogen fixing efficiency of nodule (Johnson and Hume, 1973). According to Stripe and Werner (1981), the leghaemoglobin contents and specific activity of bacterial enzyme alanine dehydrogenase are also positively correlated with the increasing nodule size. Leghaemoglobin is confined to the central nodule cells having bacteroid. Leghaemoglobin acts as O₂ scavenger and removes extra O₂ out of root nodules so that nitrogenase enzyme can work best.

Objective of the Study

The objective of the current studies is to find the effect of Various Concentrations of rogor and nuvan on leghaemoglobin content of *vigna radiata* and *vigna mungo*.

Materials and Methods

Quantitative analysis of leghaemoglobin content in nodules of control and treated plants has been done at 30th day of the emergence. For leghaemoglobin content analysis, the nodules were harvested, properly washed, dried on filter paper and weighed. Leghaemoglobin amount was worked out by the method of Hartee (1957). The data are recorded as mg/gm fresh weight of nodules.

Review of Literature

Bal A K, et.al I the year 1980 worked on Changes in the outer cell wall of Rhizobium during development of root nodule symbiosis in Soybean. Bergersen, F. et.al in 1981 calculated Leghamoglobin within bacteroid-enclosing membrane envelopes from *Glycine max*. Bergersen, F. J. and Goodchild, D. J. in the year 1973 worked on Cellular location and characterization of leghamoglobin in soybean root nodules. Francisco, P. B., and Akao, S. in the year 1993 found the action of Autoregulation and Nitrate Inhibition of Nodule Formation in Soybean CV Enrei and its Nodulation Mutant. Fuchsman, W. H. and Appleby, C. A. in 1979 Separated and determined the relative concentration of the homogenous components of soybean leghaemoglobin by isoelectric focusing.

Results and Discussion

From the present study, it was observed that the leghaemoglobin content of *Vigna radiata* and *Vigna mungo* show variability as against the

control plants when treated with different concentrations of pesticides – rogor and nuvan. The data for these parameters for *Vigna radiata* are depicted for sample I and II respectively and for *Vigna mungo* (Sample I and II).

The results for effect of rogor on *Vigna radiata* (sample I) showed that for controls the leghaemoglobin contents were 11.25, 11.24, 10.12 mg/gm, and 9.25, 8.41, 7.56 mg/gm, and 6.94, 5.12, 0.00 mg/gm for different increasing concentrations of rogor, i.e., 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0%. No results were recorded for 10% because no seed germination occurred at 10.0% and above concentration of pesticide.

Almost similar results were obtained for Sample II of *Vigna radiata* with pesticide rogor. The Lb amounts for control plants was 10.26 mg/gm and for different increasing concentrations the data were 10.25, 9.45, 8.56 mg/gm, and 8.25, 7.53, 6.45 mg/gm, and 5.54 and 0.00 mg/gm respectively for different increasing concentrations of rogor, i.e., 0.1%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0%.

The results for *Vigna radiata*, pesticide nuvan, sample I showed that the leghaemoglobin contents were 11.16 mg/gm for control plants and 11.14, 10.54, 9.06 mg/gm, and 7.78, 6.52, 6.41 mg/gm, and 5.42, 0.00 mg/gm for different increasing concentrations of nuvan, i.e., 0.1%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0%, respectively.

The result for *Vigna radiata* with nuvan, sample II showed that the leghaemoglobin content were 10.21 mg/gm for control plants as compared to 10.12, 9.12, 8.23 mg/gm, and 7.12, 6.11, 6.10 mg/gm, and 5.42, 0.00 mg/gm for increasing concentration of nuvan, i.e., 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0%, respectively.

The result for *Vigna mungo* for sample I with pesticide rogor showed that the leghaemoglobin content of control plants was 10.84 mg/gm and for other concentrations of rogor were 10.79, 9.13, 8.20 mg/gm, and 7.12, 6.94, 5.98 mg/gm, and 5.44 and 0.00 mg/gm for 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0% respectively.

The results for *Vigna mungo* for sample II with rogor showed that the leghaemoglobin content

for control plants was 10.23 mg/gm. The data for other concentrations of pesticide treated plants were 9.97, 9.21, 8.22 mg/gm, and 8.13, 7.18, 6.95 mg/gm, and 6.34 and 0.00 mg/gm for 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0% respectively. that the leghaemoglobin content for control plants was 10.36 mg/gm and for other concentration, i.e., 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0% were 9.96, 9.24, 8.2, 7.14, 6.92, 6.65, 5.3 and 0.00 mg/gm, respectively. The results (table 8.7 and figure 8.7) for *Vigna mungo* with nuvan, sample I showed.

The results for *Vigna mungo*, sample II for nuvan showed that the leghaemoglobin content for control plant was 9.97 mg/gm as compared to 9.84, 8.24, 7.96 mg/gm, and 7.54, 6.53, 6.42 mg/gm, and 4.97 and 0.00 mg/gm fresh weight of nodules for various concentrations, i.e., 0.5%, 1.0%, 1.5%, 2.0%, 2.5%, 5.0%, 7.5% and 10.0% respectively.

Conclusion

It was observed that concentration of leghaemoglobin was somewhat similar in control and very lower concentration of pesticides with very small decrease in low concentration, i.e., 0.5%, but as the concentration of pesticide was increased, then there was decline in the concentration of leghaemoglobin. The present results coincide with the observations of Dilworth and Coventry (1977). The decrease in leghaemoglobin content at higher concentration of pesticides may be due to interference of pesticide with metabolism of both root nodule and N₂-fixing bacteria affecting leghaemoglobin synthesis and turnover.

Table 1 Quantitative analysis of Lb content as affected by various concentrations of Rogor in *Vigna radiata* (Sample I)

S. N.	Treatment	Leghaemoglobin Content
1	0.0 %	11.25±0.72
2	0.5 %	11.27±0.81
3	1.0 %	10.12±0.03
4	1.5 %	9.25±0.86
5	2.0 %	8.41±0.98
6	2.5 %	7.56±0.71
7	5.0 %	6.94±0.54
8	7.5 %	5.12±0.01
9	10.0 %	0.00

Figure 1 Effect of different concentrations of Rogor on Leghaemoglobin contents of *Vigna radiata* (Sample I)

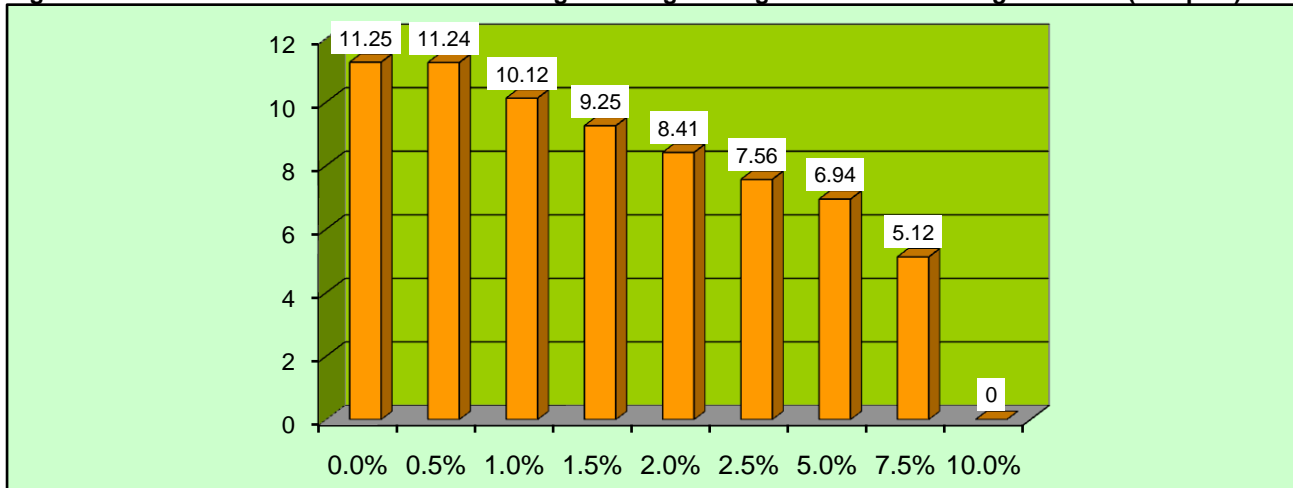
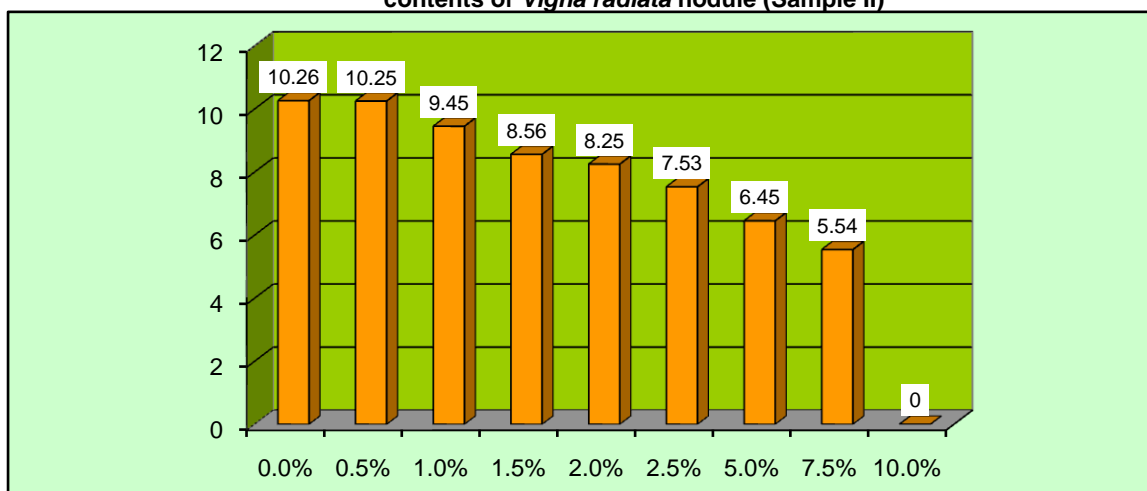


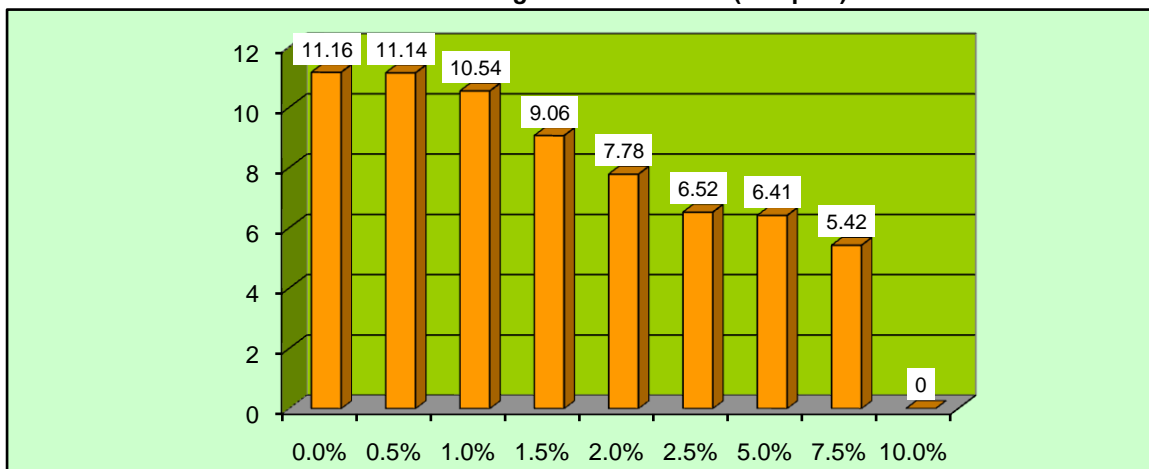
Table 2 Quantitative analysis of Lb content as affected by various concentrations of Rogor in *Vigna radiata* (Sample II)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	10.26±0.84
2	0.5 %	10.25±0.87
3	1.0 %	9.45±0.98
4	1.5 %	8.56±0.76
5	2.0 %	8.25±0.66
6	2.5 %	7.53±0.48
7	5.0 %	6.45±0.99
8	7.5 %	5.54±0.81
9	10.0 %	0.00

Figure 2 Effect of different concentrations of Rogor on Leghaemoglobin contents of *Vigna radiata* nodule (Sample II)**Table 3 Quantitative analysis of Lb content as affected by various Concentrations of Nuvan in *Vigna radiata* (Sample I)**

S N	Treatment	Leghaemoglobin Content
1	0.0 %	11.16± 1.14
2	0.5 %	11.14±0.96
3	1.0 %	10.54±1.18
4	1.5 %	9.06±0.75
5	2.0 %	7.78±0.61
6	2.5 %	6.52±0.47
7	5.0 %	6.41±0.10
8	7.5 %	5.42±0.98
9	10.0 %	0.00

Figure 3 Effect of different concentrations of Nuvan on Leghaemoglobin Contents of *Vigna radiata* nodule (Sample I)



Concentrations of Nuvan in *Vigna radiata* (Sample II)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	10.21±0.86
2	0.5 %	10.12±0.98
3	1.0 %	9.12±1.03
4	1.5 %	8.23±0.81
5	2.0 %	7.12±0.72
6	2.5 %	6.11±0.53
7	5.0 %	6.10±0.51
8	7.5 %	5.42±0.55
9	10.0 %	0.00

Figure 4 Effect of different concentrations of Nuvan on Leghaemoglobin contents of *Vigna radiata* nodule (Sample II)

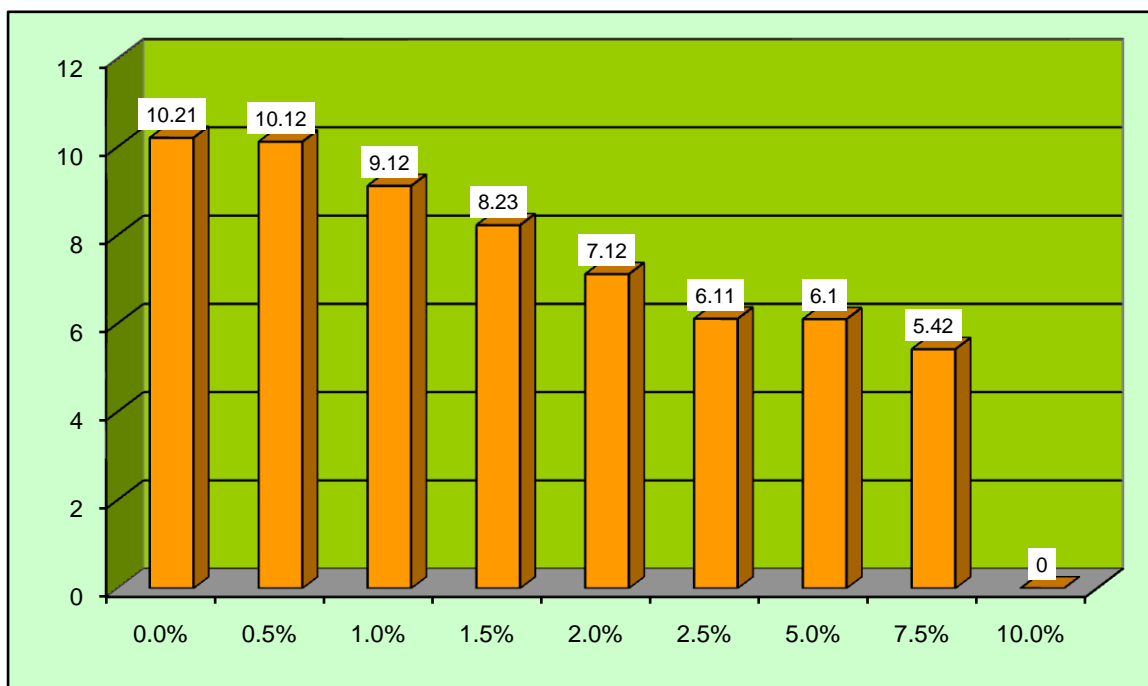


Table 5 Quantitative analysis of Lb content as affected by various concentrations of Rogor in *Vigna mungo* (Sample I)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	10.84±0.88
2	0.5 %	10.79±0.92
3	1.0 %	9.13±0.83
4	1.5 %	8.2±1.04
5	2.0 %	7.12±0.71
6	2.5 %	6.94±0.54
7	5.0 %	5.98±0.49
8	7.5 %	5.44±0.53
9	10.0 %	0.00

Figure 5 Effect of different concentrations of Rogor on Leghaemoglobin Contents of *Vigna mungo* nodule (Sample I)

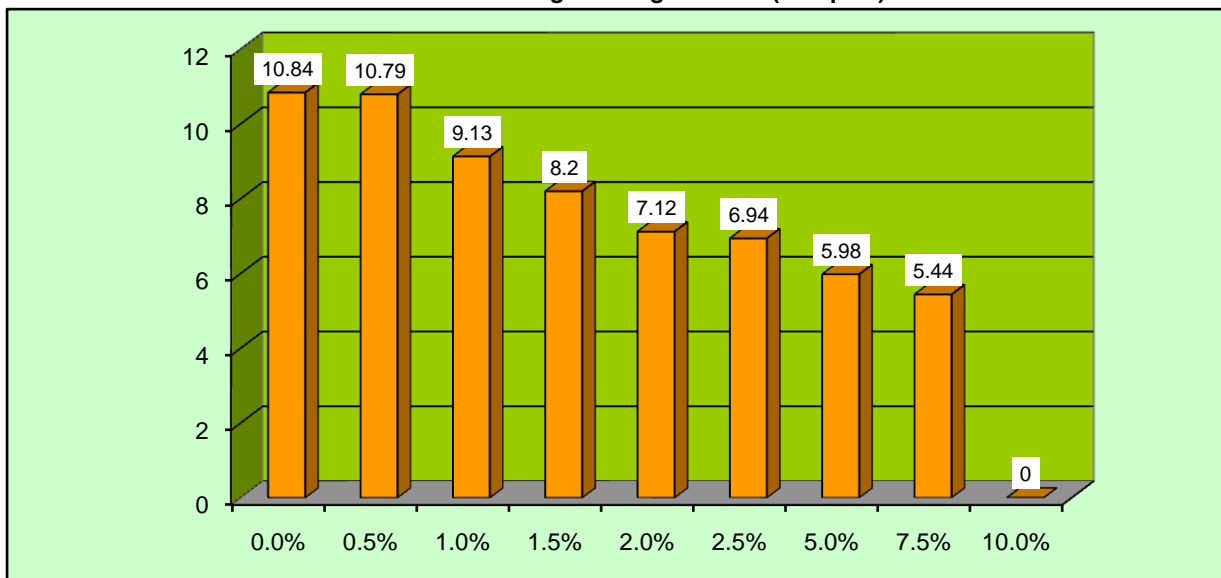


Table 6 Quantitative analysis of Lb content as affected by various Concentrations of Rogor in *Vigna mungo* (Sample II)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	10.23±1.13
2	0.5 %	9.97±0.93
3	1.0 %	9.21±1.17
4	1.5 %	8.22±0.76
5	2.0 %	8.13±0.63
6	2.5 %	7.18±0.48
7	5.0 %	6.95±1011
8	7.5 %	6.34±0.97
9	10.0 %	0.00

Figure 6 Effect of different concentrations of Rogor on Leghaemoglobin Contents of *Vigna mungo* nodule (Sample II)

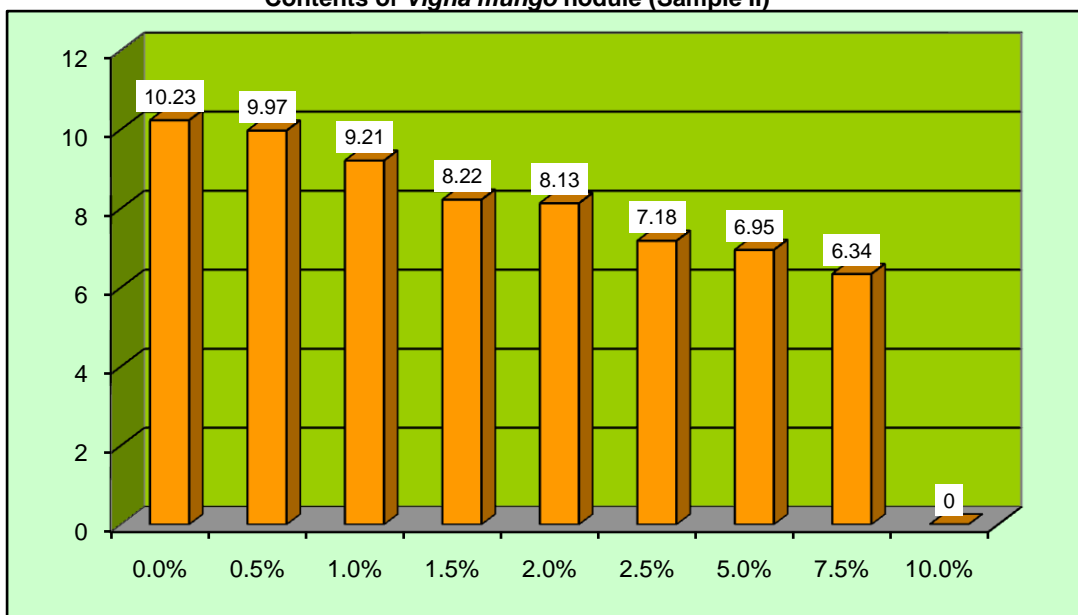


Table 7 Quantitative analysis of Lb content as affected by various concentrations of Nuvan in *Vigna mungo* (Sample I)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	10.36±0.87
2	0.5 %	9.96±0.93
3	1.0 %	9.24±0.79
4	1.5 %	8.2±1.02
5	2.0 %	7.14±0.83
6	2.5 %	6.92±0.74
7	5.0 %	6.65±0.53
8	7.5 %	5.3±0.72
9	10.0 %	0.00

Figure 7 Effect of different concentrations of Nuvan on Leghaemoglobin contents of *Vigna mungo* nodule (Sample I)

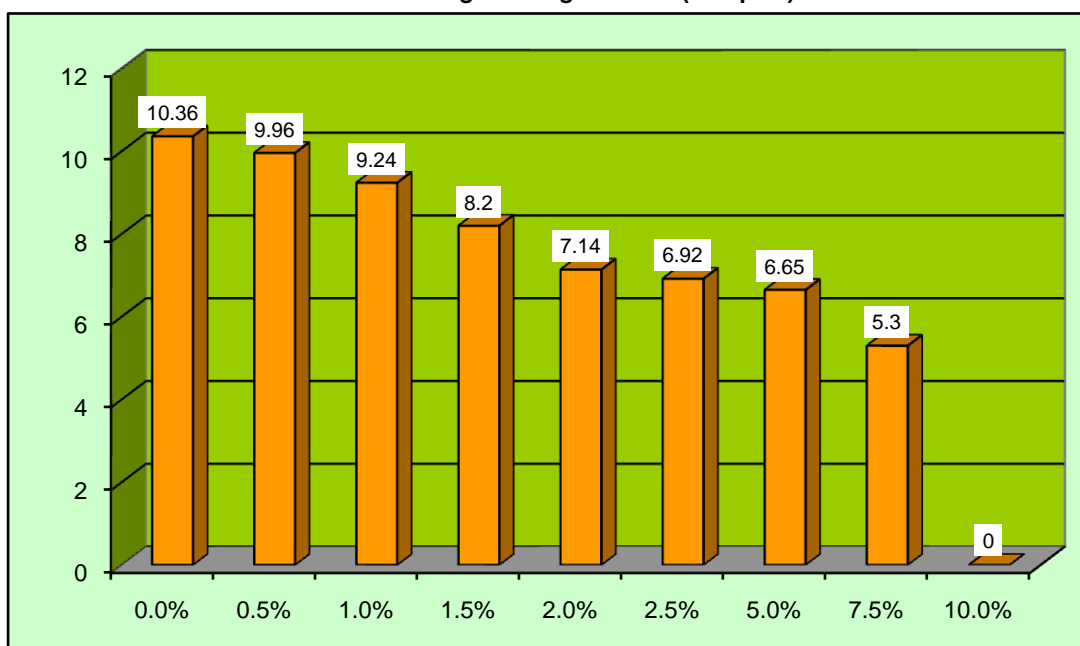
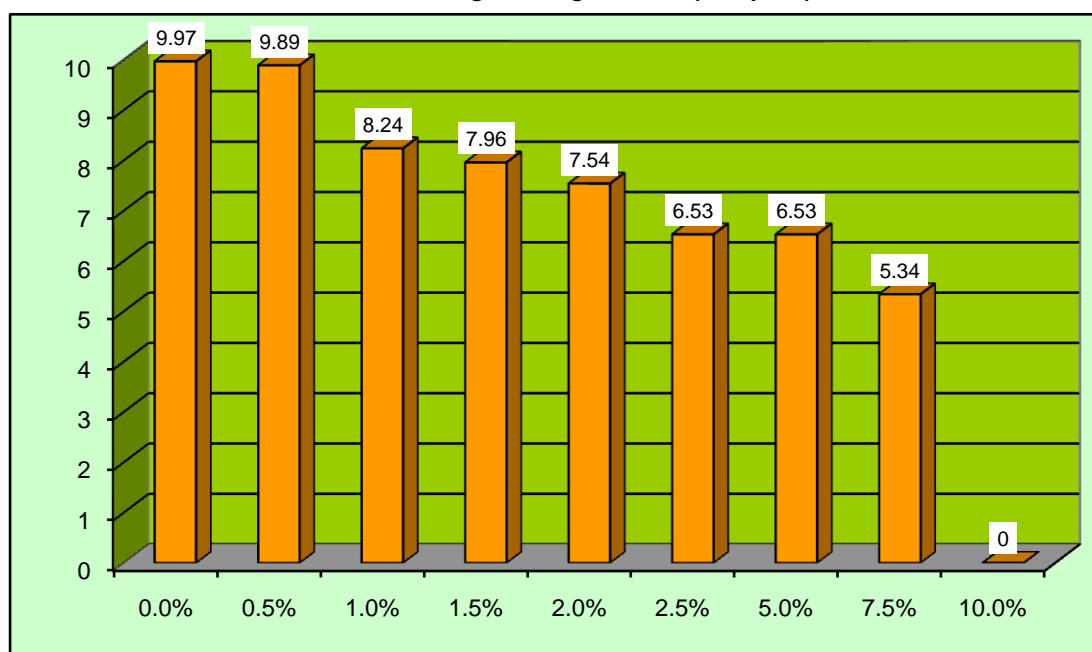


Table 8 Quantitative analysis of Lb content as affected by various Concentrations of Nuvan in *Vigna mungo* (Sample II)

S N	Treatment	Leghaemoglobin Content
1	0.0 %	9.97±0.89
2	0.5 %	9.89±0.91
3	1.0 %	8.24±0.83
4	1.5 %	7.96±0.84
5	2.0 %	7.54±1.03
6	2.5 %	6.53±0.73
7	5.0 %	6.53±0.54
8	7.5 %	5.34±0.43
9	10.0 %	0.00

Figure 8.8 Effect of different concentrations of Nuvan on Leghaemoglobin Contents of *Vigna mungo* nodule (Sample II)



References

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