Impact of Number of Spray Applications of Chemical on the Growth and Yield of Roselle (*Hibiscus sabdarifa* L.) in Ganye Area

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Abstract: Field experiment was conducted at the Teaching and Research Farm of the Department of Agricultural Technology, Adamawa State College of Agriculture, Ganye during the 2011 and 2012 cropping seasons to determine the impact of number of spray applications of chemical on the growth and yield of roselle (*Hibiscus sabdarifa* L.) in Ganye Area. The experiment was laid in a Randomized Complete Block Design (RCBD) method with four treatments replicated three times. The results obtained clearly shows that, spraying roselle three times facilitates better growth and also guarantees good yield. According to the results, the spray of roselle three times with karate in all the parameters measured gave the highest mean number of leaves, mean plant height, mean number of flowers, mean number of pods and mean seed weight in kilograms per hectare for both 2011 and 2012 cropping seasons respectively (10.50 and 9.70; 20.20 and 19.80; 15.50 and 13.20; 17.20 and 15.30; 6.70 and 4.50) compared to the control.

Key Words: Chemical, Growth, Impact, Roselle, Spray, Yield.

Introduction

Roselle (Hibiscus sabdarifa L.) belongs to the family malvaceae and is probably native to tropical Central and West Africa (Kyenge *et al*., 1999). Roselle has been cultivated in Asia for over 300 years and was introduced in to Brazil in the seventeenth century and was also recorded as one of the known crops in India (Morton, 1987). The crop is grown in many African countries such as Congo, Central African Republic, Niger, Nigeria, Benin Republic etc. In Nigeria, the crop is cultivated mostly in the Northern part of the country and in areas with low rainfall as such irrigation is employed (Kyenge *et al*., 1999). Roselle is called by several names such as "Yakuwa" (Hausa) with the harshly calyces called "Zoboroto" (Hausa), "Tabwa" (Bura), "Aswe" (Tiv), "Ishape" (Yoruba), "keusa" (Chamba), "Sha" (Higgi) etc.

A well drained sandy loam to loamy soil is desirable for roselle production. Roselle is a very sensitive to frost and its cultivation is more successful in tropical and sub-tropical regions from sea level up to 300ft (900m) with a rainfall of about 72inches (182cm) during its growing season and a temperature range of 25-30^{oc}. It can also be grown in areas of full sunlight and withstand drought (Puseglove, 1968).

The importance of the crop lies in its versatile usage. The leaves and young shoots are eaten raw or as cooked vegetables, the swollen calyces of flower are used in the preparation of beverages, preservatives and juices. The seed contain 17% edible oil and is believed to contain some toxic substances and may be better used in the soap cosmetic industries (Ojomo, 1975).

Roselle is subjected to serious insect pests attack throughout its growing stages. These include; Aphids (*Aphis gossypii*), bees (*Aphis melifera), Nezera viridula, Dysdercus* spp. These unrelenting experiences truncate the potential and hope of obtaining good growth and yield of the crop. The local farmers particularly in Ganye area are unaware of the effectiveness and the need for the application of insecticides on roselle farms and also the number of sprays required for outstanding growth and expected yield. This work tried to ascertain the effect of chemical insect pests control and also the number of spray applications required to combat the insect pests of roselle using karate (Lamda cyhalothrine).

Materials and Methods

Location of the Study Area

The experiment was carried out at the Teaching and Research Farm of the Department of Agricultural Technology, Adamawa State College of Agriculture, Ganye during the 2011 and 2012 cropping seasons.

Source of Seeds

The seed sown was bought from Ganye main market and was subsequently sorted out for damages.

Sowing

The seeds were sown in July 2011and 2012 respectively by dibbling method at the spacing of 30cm between plants and 75cm between raws.

Cultural Practices
Weeding was done manually using hoe at three and six weeks after sowing which also involves light tilling to steady the plant. Thinning was done carefully to remove or pull out extra plant so as to reduce the unnecessary plant population, competition for nutrients, moisture, light, space and air.

Spray Application
A mixture of karate EC^{R} (Lamda cyhalothrine) was sprayed or applied at 3, 6 and 9 weeks after sowing. The control plots were not sprayed while the treatments were sprayed once, twice and thrice respectively.

Data Collection
The data collected include the following: Germination count, plant height, number of leaves, number of branches, number of pods and mean seed yield in kilogram per hectare.

Statistical Analysis
Data collected were subjected to analysis of variance (ANOVA) appropriate to Randomized Complete Block Design (RCBD) according to Gomez and Gomez (1984). The treatment means were separated using the Least Significant Difference (LSD) method of mean separation at P≤ 0.05 level of probability.

Results
The results for germination count shows that, plots sprayed two times gave highest mean percentage germination count and number of leaves for both 2011 and 2012 cropping seasons (94.70 and 17.70; 95.50 and 18.00) followed by plots sprayed ones (93.00 and 16.70; 94.00 and 17.90), plots sprayed thrice (92.50 and 15.90; 93.68 and 16.57) and the least was recorded in the unsprayed plots (control) (90.30 and 13.90; 90.00 and 13.00) respectively at P≤ 0.05 using the Least Significant Difference (LSD) method of statistical analysis.

Table 1: Mean Percentage Germination Count and Mean Number of Leaves Per Plot

Treatments	Mean Percentage Germination		Mean Number of Leaves Per Plot	
	2011	2012	2011	2012
Spray 1	93.00	94.00	16.70	17.90
Spray 2	94.70	95.50	17.70	18.00
Spray 3	92.50	93.68	15.90	16.50
Control	90.30	90.00	13.90	16.35
Mean	92.63	93.29	16.05	16.35

Means with the same letter(s) are not significantly different at P≤ 0.05 using the LSD.

The highest number of branches and mean plant height for 2011 and 2012 cropping seasons were observed in plots sprayed thrice (10.50 and 20.20; 9.70 and 19.80), followed by plots sprayed twice (9.50 and 1960; 9.00 and 1850), plots sprayed once (8.50 and 18.00; 8.00 and 18.00) and the least was recorded in the control (no spray) (6.50 and 14.00; 6.00 and 13.50) respectively at P≤ 0.05 level of probability.

Table 2: Mean Plant Height and Mean number of Leaves Per 5 Plants Plot

Treatments	Mean Number of Leaves		Mean Plant Height	
	2011	2012	2011	2012
Spray 1	8.50	8.00	18.00	18.50
Spray 2	9.50	9.00	19.60	18.50
Spray 3	10 50	9.70	20.20	19.80
Control	6.50	6.00	14.00	13.50
Mean	8.75	8.18	17.75	17.58

Means with the same letter(s) are not significantly different at P≤ 0.05 using the LSD.

The highest mean number of flowers, mean number of pods and yield in kilogram per hectare for both 2011 and 2012 cropping seasons was recorded in plots sprayed three times (15.50, 17.20 and 6.70; 13.20, 15.30 and 4.50), followed by plots sprayed twice (14.60, 16.50 and 5.30; 12.70, 14.50 and 3.20), plots sprayed once (13.10, 15.20 and 4.00; 11.70, 13.50 and 2.80) and the least was seen in the control (no spray) (8.20, 9.00 and 1.90; 7.80, 8.50 and 1.90) respectively at P≤0.05 level of probability using the LSD.

Table 3: Mean Number of Flowers, Mean Number of Pods and Mean Seed Yield (kg/ha)

Treatments	Mean Number of Flowers		Mean Number of Pods		Mean Seed Yield (kg/ha)	
	2011	2012	2011	2012	2011	2012
Spray 1	13.10	11.70	15.20	13.50	4.00	2.80
Spray 2	14.60	12.70	16.50	14.50	5.30	3.20
Spray 3	15.50	13.20	17.20	15.30	6.70	4.50
Control	8.20	7.80	9.00	8.50	1.90	1.85
Mean	12.85	11.35	14.50	12.83	4.48	3.10

Means with the same letter(s) are not significantly different at P≤ 0.05 using the LSD.

Discussion

The experiment was conducted on the Research and Teaching farm of the Department of Agricultural Technology, Adamawa State College of Agriculture, Ganye during the 2011 and 2012 cropping seasons. This was to determine the impact of number of spray applications of chemical on the growth and yield of roselle (*Hibiscus sabdarifa* L.) in Ganye area.

The result clearly shows that insecticidal sprays had great impact on roselle plant growth, development and yield compared to the control. This is in harmony with Oaya, *et al*. (2011) who reported that, chemical insect pest control is still the most effective and efficient means of control because of its quick action and knock-down effect.

According to the results obtained, spraying roselle three times gave the best result in the study area as the plots sprayed showed little or no incidence of insect pest infestation from the early to the latter stage of the plant growth and development and therefore few leaves were damaged and perforated. This agrees with Kumar (1999) and Gamaraja, *et al*. (2012) who reported that, most legumes are highly susceptible to insect pest infestation but could be curtailed through the application of adequate and recommended dose of insecticidal spray applications.

It could also be deduced from the study that, low yield of the crop was obtained from the unsprayed plots. This is seen in the number of damaged and perforated leaves and since the roselle leaves are eaten as vegetables in the study area, the use of save and harmless insecticides are recommended. This is in consonance with Samaila and Oaya (2014) who suggested that insecticides with less residual effect on the crop especially vegetables should be used to minimise the rate of hazard pose to the health of the consumer.

Conclusion

It is clear that, roselle cultivation within the study area is profitable when recommended and required dose of insecticidal spray applications are administered, all other factors being equal. It should therefore be a common practice to roselle farmers within the study area to apply at least the recommended insecticides twice but most importantly three times to guarantee steady growth, development and good yield of the crop.

References

[1]. Gamaraja, J. D., Samaila, A. E. and Oaya, C. S. (2012). Evaluation of the Performance of Two Soyabean Varieties (*Glycine max* (L.) Merill) in Yola, Adamawa State. *African Journal of Agricultural Research and Development*, Volume 5, Number 3. Pp. 93-98.

[2]. Hill, S. W. and Walter, N. D. (1999). Tropical Pest of West Africa. Macmillan Publishers Ltd. London. Pp. 360-380.

[3]. Kyenge, A., Mshelia, and Okusanya, B. A. (1999). Effect of Different Spacing on the Growth and Yield of Roselle (*Hibiscus sabdarifa* L.). *Proceeding of the 33rd Annual Conference of Agricultural Society of Nigeria*, NERI, Badeggi. Pp. 135-140.

[4]. Morton, J. (1987). Roselle Fruits of Worm Climate, Florida, pp. 281-286.

[5]. Oaya, C. S., Agwanda, G. A. and Kwaji, C. I. (2011). Efficacy of Insecticidal Control on the Yield of Three Cowpea Varieties (IT84-2246, IFE-Brown and IT-994) in Yola- Nigeria. *International Journal of Food and Agricultural Research*, Volume 8, Number 2, pp. 183-187.
[6]. Ojomo, O. A. (1975). Essentials of Agricultural Science. University Press Publications. P. 81.
[7]. Puseglove, L. (1968). Tropical Dicotyledon. Longman Publications Ltd, London. P. 719.
[8]. Samaila, A. E. and Oaya, C. S. (2014). Efficacy of Insecticidal Sprays Control of Insect Pests on the Growth and Yield of Okra at Vinde- Fufore, Adamawa State-Nigeria. *Journal of Agriculture and Veterinary Science*, Volume 7, Issue 4, pp. 01-04.

