

BIBLIOGRAPHY

POCKIAS, DANIEL L. APRIL 2013. Yield and Profitability of New Zealand Spinach Planted at Four Spacings. Benguet State University, La Trinidad, Benguet.

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ABSTRACT

This study was conducted at Benguet State University Organic Farm, in Balili La Trinidad, Benguet from September 21, 2012 to February 10, 2013 to determine the plant spacing of New Zealand spinach that allow enough space for development in four months harvesting duration, determine the plant spacing that produce the heaviest yield and determined the profitability of New Zealand spinach planted from various spacings.

Result of the study revealed that New Zealand spinach planted at 50 cm x 50 cm produced more lateral branches in four month duration of harvesting but not significantly different to plants spaced at 40 cm x 40 cm and 35 cm x 35 cm. The plants spaced at 45 cm x 45 cm had the lowest count of lateral branches but not significantly lower from plants spaced at 35 cm x 35 cm.

In terms of income, plants spaced at 40 cm x 40 cm obtained the highest of Php3, 398.97 followed by 50 cm x 50 cm with Php3, 340.03, 35 cm x 35 cm with Php2, 554.46 and 45 cm x 45 cm with Php591.37. The production cost per kilogram of New Zealand spinach in an area of 60sq m was computed to be Php41.75 in four month duration.



RESULTS AND DISCUSSION

Lateral Branches per Plant

Table 1 shows that New Zealand spinach spaced at 50 x 50 cm produced more lateral branches in four months duration of harvesting which was not significantly different to the plants spaced at 40 x 40 cm. Similarly plants spaced at 40 x 40 cm did not significantly differ from the plants spaced at 35 x 35 cm which did not also differ from those plants spaced at 45 x 45 cm which had the lowest number of laterals produced.

The study of Guntan (2010) shows increasing lateral branches of individual plant from 25 x 25 cm to 40 x 40 cm but the trend in this study was different where the plants spaced at 45 x 45 cm had the lowest count of lateral branches. It was observed that the plants spaced at 45 x 45 cm had thinner stems and flowered earlier than the other treatment plants thus producing fewer lateral branches as presented in the photographs of treatments (Fig.3 to 6). It might not be the plant spacing but the differences in soil fertility which was not known.

Table 1. Lateral branches per plant

TREATMENT/ Spacing between hills and rows(cm)	MEAN
35 x 35	162.39 ^{bc}
40 x 40	239.09 ^{ab}
45 x 45	110.95 ^c
50 x 50	254.78 ^a

Means with the same letter are not significantly different at 5% level by DMRT





Figure 3. Close up photograph of 35 x 35 cm plant spacing towards termination



Figure 4. Close up photograph of 40 x 40 cm plant spacing towards termination



Figure 5. Close up photograph of 45 x 45 cm plant spacing towards termination



Figure 6. Close up photograph of 50 x 50 cm plant spacing towards termination

Weight of Shoots Harvested per Plot

Plants spaced at 50 x 50 cm, 40 x 40 cm and 35 x 35 cm had similar weight of shoots harvested per plot that significantly outweighed the shoots harvested from 45 x 45 cm as presented in Table 2. The lower count of lateral branches produced per plant from 45 x 45 cm spacing may be due to early flowering of some plants and smaller size of individual plants as reflected in Table 3 are the causes of the lower weight of shoots harvested per plot.

In the previous study of Guntan(2010), the yield per plot proportionately increased from 7.41 to 12.0 kg when the plant spacing was increased from 25 x 25 cm to 40 x 40 cm. This study, on the other hand, produced 13.18 kg at 35 x35 cm plant spacing then 16.42 kg at 40 x 40 cm with very slight increase to 16.75 kg at 50 x 50 cm. This might imply that the yield of New Zealand spinach cannot increase significantly beyond 40 x 40 cm spacing, although Davison (2010) recommend 45 cm intervals for New Zealand spinach.

Table 2. Weight of shoots harvested per (1m x 5m) plot

TREATMENT/Spacing between hills and rows (cm)	MEAN (kg)
35 x 35	13.18 ^a
40 x 40	16.42 ^a
45 x 45	5.84 ^b
50 x 50	16.75 ^a

Means with the same letter are not significantly different at 5% level by DMRT



Weight of Individual Plants

As presented in Table 3, the weight of individual plant after the last harvest showed that the plants spaced at 50 x 50 cm, 40 x 40 cm and 35 x 35 cm slightly differed. Further comparison shows that plants spaced at 35 x 35 cm and 45 x 45 cm had similar weights. It is apparent that the weight of individual plant corresponding increased as the plant spacing is increased but the plants spaced at 45 x 45 cm did not follow the trend. However, as mentioned earlier the plants stem were thinner and had early flowering which may reduce plant growth resulting to lighter weight of individual plant.

In the study of Guntan (2010), the plants spaced at 30 x 30 cm had the lowest weight of individual plant samples, although the trend is similar that the weight of plant increases as the spacing is increased. This is because the plant is provided with more space to grow and develop when spacings are increased.

Table 3. Weight of individual plants (g)

TREATMENT/Spacing between hills and rows (cm)	MEAN (g)
35 x 35	1573.33 ^{ab}
40 x 40	2056.67 ^a
45 x 45	1216.67 ^b
50 x 50	2376.67 ^a

Means with the same letter are not significant at 5 % level by DMRT





Figure 7. Harvested New Zealand spinach shoots being weighed at 250 grams



Figure 8. Properly packed and labeled New Zealand spinach shoots ready for delivery to the BSU organic market

Cost and Return Analysis

The different plant spacings have varied influence in the yield of New Zealand spinach which affected the sales and net income. Table 4 shows that plants spaced at 50 x 50 cm have slightly higher yield and sales compared to the other plant spacings. However, plants spaced at 40 x 40 cm obtained the highest income of P3,210.66 followed by the

plants spaced at 50 x 50 cm, 35 x 35 cm and 45 x 45 cm with net income of P3,152.72, P2,356.15 and P403.06, respectively. In the return on investment, plants spaced at 40 x 40 cm had 187.17% or P1.87 return for every peso spent in the production which was followed by 50 x 50 cm of 168.15% or P1.68 for every peso spent in the production and 35 x 35 cm spacing with 147.36 % ROI. The lowest return on investment was obtained from the plants spaced at 45 x 45 cm of 29.96%.

It was reported by Guntan (2010) that New Zealand spinach spaced at 40 x 40 cm had the highest yield and net income but recommended the study of wider spacings as the researcher still observe increasing yield from the spacings studied. From this follow up study, the trend of increasing yield was observed from 35 x 35 cm to 50 x 50 cm but the increase of yield from 40 x 40 cm and to 50 x 50 cm seem to be very insignificant, which may suggest that the appropriate plant spacing for New Zealand spinach is 40 x 40 cm.

Based on the yield and the expenses incurred in this study, the production cost per kilogram of New Zealand spinach is P 41.75.



Table 4. Cost and return analysis

ITEM	PLANT SPACING			
	35 x 35 cm	40 x 40 cm	45 x 45 cm	50 x 50 cm
YIELD (kg)	39.55	49.26	17.51	50.26
SALES (Php)	3,955.00	4,926.00	1,751.00	5,026.00
EXPENSES				
Seedlings	58.50	49.50	45.96	41.79
Guano phosphate	11.78	9.97	9.06	9.06
Cellophane	67.67	84.91	30.17	87.06
Paper plate	113.97	143.02	50.82	146.65
Sticker	67.67	84.91	30.17	87.06
Scotch tape	5.02	6.30	2.24	6.46
Labor cost				
Cleaning	31.25	31.25	31.25	31.25
Digging plots	46.87	46.87	46.87	46.87
Planting	78.12	78.12	46.87	46.87
Fertigation	7.81	7.81	7.81	7.81
Irrigation	46.87	46.87	46.87	46.87
Harvesting	875.00	937.00	812.00	1,125.00
Depreciation cost				
G.I Pipes	80.12	80.12	80.12	80.12
Roofing	108.19	108.19	108.19	108.19
Expenses (Php)	1,598.85	1,715.34	1,347.44	1,847.28
Net/ loss (Php)	2,356.15	3,210.66	403.06	3,152.72
ROI %	147.36	187.17	29.96	168.15

Note: selling price per kilo of New Zealand spinach was Php100.00/kg at BSU organic market.



SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

This study was conducted at BSU Organic Farm, in Balili La Trinidad, Benguet from September 2012 to February 2013 to determine the plant spacing of New Zealand spinach that allow enough space for development in four months harvesting duration, determine the plant spacing that produce the heaviest yield and determine the profitability of New Zealand spinach planted from various spacings.

Result of the study revealed that New Zealand spinach planted at 50 x 50 cm produced more laterals branches in five months duration of harvesting but not significantly different to plants spaced at 40 x 40 cm and 35 x 35 cm. The plants spaced 45 x 45 cm had the lowest count of lateral branches but not significantly lower from 35 x 35 cm.

In terms of income, plants spaced at 40 x 40 cm obtained the highest of P3,210.66 followed by 50 x 50 cm with P3,152.72, 35 x 35 cm with P2,356.15 and 45 x 45 cm with P403.06. The production cost per kilogram of New Zealand spinach was computed to be P41.75.

Conclusion

Based on the presented results and discussion, there is a corresponding increase in yield of New Zealand spinach as the plant spacing is increased from 35 to 50 cm but it appears that the optimum spacing for New Zealand spinach is 40 x 40 cm under the condition of the experiment area to obtained the highest profit of P3,210.66.



Recommendations

It is therefore recommended, that New Zealand spinach be planted at a distance of 40 x 40 cm to obtain a good profit. It is further recommended that the results be verified due to the early flowering of the plants from the 45 x 45 cm spacing.



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