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Research Article

# Evaluation of Agronomic Performance of Sweet basic (*Ocimum basilicum L.*) at Different Inter-row Spacing in Jalingo, Northeastern Nigeria

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## Abstract

The study examined factors influencing honey marketing in Abia State, Nigeria. It specifically examined socioeconomic characteristics of respondents; analysed the cost and returns, marketing margin and marketing efficiency; and identified the factors influencing profits among honey marketers. Thirty respondents were drawn from each zone respectively to have 90 respondents. From the zones, Ikwuano LGA was selected form Umuahia Zone, Isikwuato LGA from Ohafia zone and Osisioma LGA from Aba zone. The results showed that males dominated the both markets with a fair distribution of ages. The marketing margins and efficiency were high indicating the existence of excellent performance in the entire honey market. The multiple regression analysis showed that there were significant factors influencing marketers' profits. It showed that marketing experience and patronage size were positively related to profits in both markets with household size and storage cost negatively affected profits in both markets too. Based on the findings of study, it was recommended that government should provide rural areas with developmental projects so as to reduce youth's urban migration and thus get them involved in honey marketing and as well as provide marketers with market grants and loans at low interest rates. Marketers on their own are advised to form intricacies for improving overall profits.

## Introduction

Sweet basil *(Ocimum basilicum L.)* is an annual herbaceous important Species of cultivated aromatic and medicinal Plants belonging to the family *Lamiaceae* (Mint family). This family *Lamiaceae* includes about 3,200 Species of annual and non woody perennials which are widely distributed almost over the temperate and tropical regions of the world (Alemu et al. 2018; Abewoy et al., 2018, Khalid et al., 2006). The most widely cultivated species in the world are *O. basilicum L., O. gratissiumum, O. xcitriodorum, O. americanum L., O. minimo L., and O. tenuiflorum, L.* The leaves of *Ocimum basilicum L.* are ovate, tip acute, Petiolate, green, 5-10 cm long and finely serrate [1].

Basil originates from Southern Asia and currently cultivated mainly through the Mediterranean regions of Europe, as well as in Asia and Africa. However, it is also grown in temperate zones [2]. The plant are widely cultivated with intense distinctive herbal spicy and sweet aroma. Moreover, the leaves are widely used for flavouring purposes in soups, meat pies, fish dishes, certain cheeses, tomato salads, cooked cucumber dishes, cooked peas, squash and string beans as well as Vinegars and oils [3-5]. The essential oil from Basil is extensively employed in Several European countries and USA for flavoring and food Stuffs, confectionery goods condiments and toiletry products such as mouthwashes and dental creams [6].

There are different factors, which can limit production and productivity of the basil plant. Between the major factors, the effect of genotype and inter-row spacing have been reported [7]. Essential oil content decreases as plant spacing decreases [8]. There is dearth of information on ignorance of plant spacing, which affect the productivity of this important crop. The few farmers who cultivate the plant in the study area still grow the plant without proper plant spacing and this affect its survival as well as yield. This investigation is needed to provide agronomic information suited to build conservation capacity at the local level through development of some cultivation practices and also enhancing the production of *O. basilicum L.* in commercial quantity of which the commercial production can yield economic returns to the farmers and provide foreign exchange to the country as well as raw materials for drugs and to preserve the shelf life of agricultural products [9].

## Materials and Methods

The field experiment was carried out in 2017 and 2018 rainy seasons at the Teaching and Research farm of the Crop Science Department, Taraba State College of Agriculture Jalingo (Latitude 8° 5°" N and Latitude 11° 50" E). The treatments evaluated were 30, 40, 50 and 60 cm inter-row spacing, laid out in a randomized complete block design (RCBD) replicated three times.

The land was cleared manually with machete, fine tilled and seedbeds of 2m × 3m (6m$^2$) Made with hoe and Spade. 1m wide pathways demarcated Contiguous Plots, while blocks each containing four unit plots spaced 1.5m apart. The bounds were constructed at the end of plots and at intervals between the Plots to control run off and erosion. Black (1965) took composite Soil Samples from the gross Plot area for routine analysis in the laboratory using the procedure.

Seeds of *Ocimum basilicum L.* Sourced from farmers Seed banks in Jalingo were raised in nursery for four weeks before transplanting to the trial field. The four weeks old Seed lings were transplanted at the inter-row spacing of 30, 40, 50 and 60cm

by 20cm intra-row spacing. Manual hand weeding using hoe was carried out at three and six weeks after transplanting (WAT).

Harvesting was carried out by cutting the Basil plant 5cm above the ground with Sharp Knife eight weeks after transplanting. Parameters measured on five-tagged plant were plant height (cm). Primary and Secondary branches, leaf length/width (cm), Fresh and dry leaf weight (g), fresh and dry herbage yield (t/ha). Data collected were subjected to analysis of variance (ANOVA) and Significant means (P < 0.05) were compared using the least Significant difference (LSD).

## Results and Discussion

The Sweet basil plants tested responded positively with increase in inter-row spacing in all agronomic parameters assessed (Table 1). Plant height= differed Significantly (P < 0.05) at each inter-row Spacing and was highest in Plants Sown at an inter-row Spacing of 60cm (36.2/36.3cm) at 4 weeks after transplanting of (45.1/46.2cm) at 6 WAT in 2017 and 2018 respectively. Primary and Secondary branches followed the same trends with highest number in plants Sown at 60cm inter-row Spacing (8.2/8.5) and (72.1/72.2) in 2017 and 2018 respectively. While shortest plants and lowest number of branches were is similar to the findings of *Ojeifor et al.* [9] who reported an increase is plant height and number of branches as a result of wider spacing.

The inter-row Spacing of 60cm significantly (P<0.05) produced longest leaf (4.8/5.0cm), widest leaf (3.1/3.3cm), highest fresh leaf weight (241.2/241.6g) in 2017 and 2018 respectively. Similar trend were obtained in fresh herbage yield (12.6/12.8 t/ha) and dry herbage yield (2.3/2.4 t/ha) at an inter-row spacing of 60cm in 2017 and 2018 respectively. While there was decreased from the result obtained as the inter-row Spacing decreases (Table 2). This result is in agreement with *Alemu et al.* [7] who reported similar trends to wider spacing [10].

**Table 1:** Growth Parameters of *(Ocimum basilicum L)* as affected by inter-row spacing in Jalingo, Northeast Nigeria.

| Treatment | Plant height (cm) | | | | Number of Primary Branch/Plant | | Number of Secondary branches/Plant | | Leaf Length (cm) | | Leaf width (cm) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Inter-row Spacing (cm) | 2017 | | 2018 | | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 |
| | 4WAS | 6WAS | 4WAT | 4WAS | 6WAS | 6WAS | 6WAS | 6WAS | 6WAS | 6WAS | 6WAS | 6WAS |
| 30 | 29.2 | 34.2 | 29.5 | 33.4 | 5.1 | 5.3 | 39.1 | 39.4 | 3.1 | 3.3 | 1.2 | 1.3 |
| 40 | 33.3 | 37.7 | 33.4 | 37.9 | 5.7 | 5.8 | 49.0 | 49.2 | 3.6 | 3.8 | 1.9 | 2.1 |
| 50 | 34.7 | 43.7 | 34.9 | 43.8 | 6.6 | 6.9 | 59.0 | 59.1 | 7.0 | 4.1 | 2.6 | 2.7 |
| 60 | 36.2 | 45.1 | 36.3 | 46.2 | 8.2 | 8.5 | 72.1 | 72.2 | 4.8 | 5.0 | 3.1 | 3.3 |
| LSD | 1.20 | 1.23 | 1.20 | 1.24 | 0.63 | 0.65 | 6.52 | 6.60 | 0.2 | 0.25 | 0.20 | 0.22 |

WAT = Weeks after transplanting.

**Table 2:** Growth Yield Parameters of *(Ocimum basilicum L)* as affected by inter-row spacing in Jalingo, Northeastern Nigeria.

| Treatment | Fresh leaf weight Per Plant (g) | | Dry leaf weight Per/Plant (g) | | Fresh herbage yield ( t/ha) | | Dry herbage yield (t/ha) | |
|---|---|---|---|---|---|---|---|---|
| Inter-row spacing (cm) | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 | 2017 | 2018 |
| 30 | 84.7 | 84.9 | 10.5 | 11.1 | 1.7 | 1.8 | 0.7 | 0.8 |
| 40 | 102.0 | 103.0 | 23.3 | 23.5 | 3.2 | 3.4 | 1.1 | 1.3 |
| 50 | 149.3 | 149.8 | 42.9 | 43.2 | 7.9 | 8.1 | 1.9 | 2.0 |
| 60 | 241.2 | 241.2 | 70.7 | 71.1 | 12.6 | 12.8 | 2.3 | 2.4 |
| LSD (0.05) | 23.10 | 23.40 | 11.2 | 11.40 | 1.25 | 1.28 | 0.21 | 0.22 |

## Conclusion

Sweet basil growth and yield indices were maximized at the widest spacing, indicating that further yield improvement could still be obtained at inter-row spacing wider than 60cm. However, farmers could adopt this inter-row spacing to maximize the optimal performance of this Vegetable in the study area.

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