EFFECTS OF VARYING AGRONOMIC PRACTICES ON SOME SHOOT CHARACTERISTICS OF SESAME (*Sesamum indicum* L.)

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Abstract

Field experiments were conducted during the late cropping seasons of 1990-1992 at Badeggi (9^o 4', 46^o 7'E), an experimental station located in the guinea savanna region of Nigeria to determine the expression of some shoot characteristics of sesame as influenced by row spacing, nitrogen (N) and phosphorus (P) application. Results indicated that in 1990, increase in inter row spacing significantly ($P<0.05$) reduced height to first capsule and branch, and number of branches per plant. Whereas, intra-row spacing significantly ($P<0.05$) reduced height to first capsule when increased from 5 to 15 cm in 1990, and increased number of branches per plant in 1991 with 15 cm recording the highest value (3.4). Number of branches per plant significantly increased with N application compared with the control in both years. P application at 30 and 60 kg P_2O_5/ha ,however, significantly increased sesame height at maturity compared with the control in both years and height to first capsule in 1991. Inter-row spacing of 60cm recorded the highest grain yield of 315.10 and 90.1 kg/ha in 1990 and 1991, respectively.

Key words: nitrogen, phosphorus, row spacing, sesame, shoot characteristics.

INTRODUCTION

Sesame (*Sesamum indicum* L.) is an important tropical oilseed crop that is rapidly gaining importance in the world market because of its rich and high quality edible vegetable oil that is on a very high demand in the world market. The crop is grown mainly for its seed which contains about 50 – 52% oil, 17 – 9% protein and 16 – 18% carbohydrate (Ustimenko-Bakumovsky, 1983). Nigeria accounted for just 15,000 tonnes of the world's 2.6 million tones of sesame produced in 1980 (Weiss, 1983). In recent times, efforts of scientists have been geared towards harnessing various sources of edible vegetable oils to augment the rapidly reducing traditional sources of vegetable oil (groundnut and oilpalm). Consequently, other potential sources like soybeans, sesame and sunflower are being exploited.

The growth performance of sesame in terms of shoot characteristics of sesame such as plant height, height and type of branching, height to first capsule, number of branches per plant, internode length, number of nodes have been reported to be largely variety specific (Weiss, 1983, Ogunbodede and Ogunremi, 1986 and Ogunremi and Ogunbodede, 1986). Furthermore, traits like plant height, capsule number and weight of seeds in some Nigerian sesame genotypes have been reported to have direct effect on grain yield (Ogunremi and Ogunbodede, 1986). However, there is limited information on the effects of some agronomic practices on the expression of these characteristics that influence grain yield. This study was conducted to evaluate the effects of row spacing, nitrogen and phosphorus applications on some shoot characteristics of sesame.

MATERIAL AND METHODS

The field experiments were carried out at Badeggi (9^o 4', 46^o 7'E) located in the guinea savanna region of Nigeria. Experiments on row spacing were conducted in 1990 and 1991, while those on nitrogen and phosphorus were carried out in 1991 and 1992. The soils were sandy loam in texture with a pH range of 5.9 – 6.4. Total N% , available P and exchangeable K ranged between 0.03 – 0.05%, 8.6 – 18.7ppm and 0.10 – 0.26 me/100g soil, respectively.

The row spacing trial was laid out in randomized complete design with a split-split plot arrangement replicated three times. The two test varieties: ABBS-3-2 (local check) and E8 (improved variety) were the main plot, while inter rows (30, 60 and 90 cm) and intra-rows (5, 10 and 15 cm) were the sub plot and sub-sub plots, respectively. The design adopted for the nitrogen and phosphorus application experiment was also randomized complete block in 4x3 factorial arrangement. The four levels of N (0, 30, 60 and 90 kgN/ha) and three levels of P (0, 30 and 60 kgP_2O_5/ha) were factorially combined and replicated three times. The test variety was E8. Planting was done at 60X5cm. A uniform dose of 30 kg/ K/ha was applied with other fertilizer treatments by band placement.

Five plants were randomly selected and tagged from the middle rows on plot basis for the purpose of data collection on plant height at maturity, height to first capsule, height to first branch and number of branches per plant. Grain yield was determined from plants in the net plot. All data were subjected to analysis of variance and means of significant treatments were separated using the lsd method (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Row spacing

The main effects significantly affected most of the shoot characteristics evaluated more than the interaction effects in both experiments. The inter-row x intra-row interaction was only significant for height to first capsule and branch in 1991. Row spacing of 30x10cm and 60x10cm recorded the highest values for heights to first capsule (69.9cm) and branch (54cm), respectively (Table 1). 60x5cm and 60x10cm have been reported as the appropriate planting pattern for sesame in southern guinea savanna of Nigeria (Olowe and Busari, 1994).

E8 (improved variety) recorded significantly ($P<0.05$) higher number of branches (3.6) than ABBS-3-2 (local variety) (1.7) in 1990. The responses of both varieties to the imposed treatments followed similar trends in both years. This confirmed the earlier report that expression of some of the shoot characteristics are variety specific (Weiss, 1984). Height to first capsule and branch increased significantly ($P<0.05$) as the inter row spacing became narrower in 1990. This response could be due to the crowding effect of plants grown under narrow to medium sized rows (i.e 30-60cm). Number of branches per plant also increased significantly ($P<0.05$) as inter row spacing increased. Inter row spacing of 60cm produced the tallest (significant at $P<0.05$) plant in 1991 and highest grain yield in 1990. Reduction in intra row spacing significantly ($P<0.05$) reduced height to first capsule in 1990 and increased number of branches per plant in 1991 (Table2).

Effect of N & P application

NxP interaction effects on the shoot characteristics were not significant. This indicates that the effects of N and P on these traits were independent. Therefore, only the main effects of N and P were presented on Table 3. N application had more effects on the shoot characteristics than P application in 1991 and 1992. Sesame plants that received N were significantly taller than the control in 1992. They also recorded significantly taller height to first capsule than the control in 1991. Application of 90kgN/ha recorded the tallest height to first capsule. Number of branches per plant increased with increase in N level attaining the highest value at 90 kg N/ha in 1991 and 60 kgN/ha in 1992. P application significantly increased plant height at maturity in both years. Plants that received 30 and 60 kg P_2O_5/ha recorded plant heights that were significantly taller than the control. The main effects of N and P did not significantly affect grain yield in both years (Table 3). Lack of significant yield response to phosphorus is in line with earlier findings of Daulay and Singh (1982). Marginal insignificant yield response was observed with increase nitrogen level attaining the peak at 90 and 60kg N/ha in 1991 and 1992, respectively. This could suggest that sesame is a low nitrogen response crop. Earlier reports have shown that maximum grain yield of sesame was recorded on relatively low to medium levels of 30 – 60 kgN/ha by Subramaniah et al . (1979) and, Daulay and Singh (1982), respectively. The relatively low performance of sesame especially in 1991during our study could be partially attributed to Cercospora leaf spot infection noticed on the leaves.

The implication of the results of these two experiments is that sesame plants grown as rain feed crop could be conveniently harvested manually and mechanically because of the ranges of height to first capsule (58.7 – 77.8 cm) and branches (32.8 – 48.8 cm) recorded in this study using any of the twelve methods described by van Rheneen (1967). However, more efforts should be geared towards carrying out researches that will determine the appropriate nutrient requirements and harvesting techniques for this potential oilseed crop in the tropics.

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Received for publication on April 28 , 2006
Accepted for publication on May 31 , 2006

Tab.1 : Effects of inter row x intra row interaction on height to first capsule N (HTFCA) and first branch (HTFBR) of sesame (1991)

Shoot Characteristics (cm)	Inter row (cm)	Intra row (cm) 5	10	15
HTFCA	30	55.7	69.9	63.8
HTFBR		42.0	43.1	51.2
HTFCA	60	57.6	67.0	63.8
HTFBR		37.4	54.0	45.6
HTFCA	90	65.5	59.1	58.6
HTFBR		47.1	43.1	42.1

SE± HTFCA 3.44 cm
HTFBR 4.15 cm

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