

Effect Of Sowing Date On Calyx Yield And Yield Components Of Roselle (*Hibiscus Sabdariffa L.*) In Northern Guinea Savanna

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Abstract: The study is aimed at determining the most appropriate sowing date on yield and yield attributes of Roselle [*Hibiscus sabdariffa L.*] in Northern Guinea Savanna. The Experiment was conducted in the wet season of 2009 of Adamawa State University, Mubi. Ploughing was done before planting of the seeds of at s spacing of 30cm X 30cm. The effect of sowing date on yield and yield attributes of Roselle (*Hibiscus sabdariffa L.*) was examined in experiment conducted in the wet season of 2009 at Adamawa State University Mubi. Four sowing dates using local varieties of roselle spanned between July and August were laid in a randomized complete block design (RCBD) replicated three times. Data were collected on plant height, leaf length, leaf width, days to 50% flowering, number of fruit per plant, fresh calyx yield and dry calyx yield. Result revealed that roselle sown in mid July had superior vegetative growth of plant height (33.95 cm), leaf length (16.83 cm), leaf width (7.75 cm) and days to 50% flowering (93) which were significant ($p=0.05$) to other sowing dates. August sown roselle recorded longer days of (101) relative to the ones sown in July. Roselle sown in mid July however gave the highest number of fruits (134), fresh calyx length (5.8cm), fresh calyx yield (139.59kg/ha) and dry calyx yield (81.03kg/ha) with an advantage to other sowing dates. Result revealed that roselle sown in mid July had superior vegetative growth as shown in significantly ($p=0.05$) affected by sowing date with the August sown taking longer days relative to the ones sown in July roselle sown in mid July however gave the highest calyx yield 81.03kg/ha with an advantage to other sowing dates. The need to screen the type of seed along side with other agronomic properties in this type of study cannot be over emphasized. [New York Science Journal 2010;3(11):1-4]. (ISSN: 1554-0200).

Key words: Sowing, Roselle, yield, treatments, productivity

Introduction

Sowing date is an important factor in crop production and productivity as it can positively or negatively affect crop performance and yield. Roselle a tropical annual shrub, which fruit like structures containing eligible pigment belongs to the malvaceae family (Ghazali, 1999). Morton (1987) reported that roselle calyces were being shipped to Germany, France, Switzerland and Italy at the rate of 10 to 25 tonnes annually. Schippers (2000) observed that Roselle is now considered one of the competitive beverages in the world. Roselle is believed to have originated from India, but now widely cultivated through out the tropical world for its calyces, leaves and fiber (William *et al*; 1980). In terms of nutritional values, Roselle has been found to be a good source of protein (Mohammed and Idris, 1991, Mukhtar, 2007). Gibbon and pain (1995) have earlier reported that the red calyces surrounding the fruits are used to brew non- alcoholic drinks and as colouring reagent for jelly, jam, beverages and foods. The leaves of Roselle are eaten as vegetables while the seed are used as feed meal for fish and domestic animals (Mukhtar, 2007). In Nigeria, Roselle has become an important source of

raw material for a beverage drink called "Zoborodo" in Northern Nigeria. This drink is a hot water extract of Roselle calyx locally processed with sweeteners, spices and flavour such as ginger, vanilla, straw berry and pineapple (Arowosoge, 2008).

In Nigeria, its production is mainly in the Guinea and Sudan savanna zones of the country where the red calyx genotype are prevalent and the green calyx type is mainly found in the south western part of the country (Alegbejo, 2000). Roselle in spite of its food and medicinal value is classified as a minor crop where many farmers in Nigeria plant it without due consideration for appropriate sowing date which affect yield and quality of the produce (calyx). Consumer acceptability, based on calyx quality in terms of colour, taste, calyx size, aroma and yield is an important factor. Roselle is tolerant to a wide range of environmental conditions, particularly well suited to cultivation in hot, dry regions on a wide range of soils. Some cultivars will also give economic yields in wet, humid areas although optimum rainfall in 18 to 20 in distributed over 3 to 4 months. Roselle is sensitive to daylength, requiring a short day of 12 to 13hours (Tindall, 1983). Depending on the variety it matures

from 12 to 16 weeks from sowing where diseases and pest are rarely serious. Rain or high humidity during the harvest time and drying can downgrade the quality of the calyces and reduce the yield. This study was therefore conducted to evaluate the effect of sowing date on calyx yield of Roselle that is capable of enhancing its productivity.

Materials and Methods

The experiment was conducted at Adamawa State University Mubi, Nigeria (10°08'N, 13°10'E) in the Northern Guinea savanna zone during the wet season of 2009 to examine the effect of sowing date on yield and yield attributes of calyx. Deep red variety commonly used by the people was purchased from the open market before planting after ploughing and harrowing of the trial site. The deep red variety grows up to 80-100mm in height, robust in size, branches profusely and produces leaves of very dark shade of green.

Four sowing date viz: 15th July 2009, 22nd July 2009, 29th July 2009 and 4th August respectively were used. The experimental design was a randomized complete block design (RCBD). There were three replications and plot size was 12m² with 0.5m pathway between plots and 1m pathway between replications. Crop spacing was 30cm x30cm. Data collected from the field were from the plants randomly selected in the four middle rows of each plot while the outer ones were left as discards. Data were collected on plant height, number of leaf, leaf length, leaf width using meter rule, days to 50% flowering, number of fruits, fresh calyx length, fresh and dry calyx yields were estimated by counting, measuring and weighing while the fresh calyx length as an index of yield was estimated using a vernier calliper.

Analysis of variance (ANOVA) was used to evaluate treatment effect and mean separation was based on the least significant difference (LSD) at the 5% probability level (Steel and Torrie, 1980).

Result and Discussion

The vegetative growth of Roselle as affected by sowing date was determined by evaluating the plant height and the number of leaves. This is in total agreement with Pfeiffer and Harris (1990) who observed that, plant height measurement are used as an indicator of vegetative growth. There was significant difference ($P=0.05$) in the plant height and days to 50% flowering of Roselle with no significant difference in leaf length and leaf width (Table 1). Sowing date three (SD3) had taller plants (33.500cm) whereas SD2 had shorter plants with a mean of (26.08cm). The superior vegetative growth recorded by SD3 was probably due to a high cumulative rainfall amount prevalent in sowing date. Significant

difference ($P=0.05$) was recorded for Roselle leaves and days to 50% flowering. More luxurious and faster vegetative growth was therefore favoured by sowing Roselle late July and early August. The level of vegetative growth that should prepare the crop for flowering is therefore attained in late July and early August. This has implication on both time and resource use in production practices. The demand for growth most likely affects the performance of other treatments. Crops sown in early August recorded more number of days to 50% flowering. These indices of crop earliness indicate that Roselle crop sown in July come into bearing earlier than the one sown in August and this has implication on the use of production resources and probably on crop productivity. According to Twain et al (2002), plausible explanation for the relative earliness of July sown roselle is the strength or photosensitivity in Roselle as such plant would flower early in condition of short sunlight durations and may not flower when sunlight duration is above 11 hours. This result is in total agreement with the findings from the present study. Roselle was planted on a sandy loam soil which gave an impressive performance. This result conforms with the findings of Huxley (1992) who found that Roselle prefers a well-drained loamy soil with PH value ranging from 4.5 to 8.0. The conduct of this study in the northern Guinea savanna zone of Nigeria is corroborated by Doughari et al; (2008) who observed that Roselle has a wide spread in the savanna regions of Nigeria where it is cultivated. However, Gibbon and Pain (1995) on a study of crops of the drier regions of the tropics reported that there is no consistency in the quality and yield of crops harvested during dry periods. The result of the effect of sowing date on the number of fruit produced per plant is summarized in Table 2. The analysis of Variance showed significant ($p=0.05$) effect of sowing date on number of fruit per plant. The highest number of fruit (134) was obtained with SD2. Delayed sowing till late July and early August significantly reduced the number of fruit with a corresponding implication on calyx yield. Fresh calyx length (Table 1) differed significantly between sowing date, Mid July sown crop had longer calyces. This tract is considered important as longer calyces would result in high yield and compensate for few calyx number as found in late July and early August sown Roselle. Fresh and dry calyx yield (Table1) showed a significantly ($p=0.05$) difference. The red calyx genotype of roselle was planted which performed very well in the yield and yield determining characters. This result is in line with the findings of Alegbejo (2000) who viewed that red calyx genotype of roselle are prevalent mainly in the Guinea Sudan Savanna of Nigeria. The mid July and late July sown crop significantly produced higher fresh and dry calyx

yield relative to the two other sowing dates. This observation implies that the vegetative growth superiority of the mid July sown Roselle gave it a corresponding reproductive yield advantage. Sowing date significantly ($p=0.05$) affected calyx yield with the mid July sown Roselle having the highest yield of 81.03kg/ha compared to other sowing dates. The result shows that the early August sown Roselle (Table 2) recorded the lowest calyx yield of 39.54kg/ha. The vegetative advantage of the mid July sown Roselle therefore result in superior calyx yield. It could therefore be implied that sowing date that

favour high vegetative growth based on this result favour high calyx yield. The yield superiority of SD1 is attributable to the production of longer calyx in relation to other sowing dates. Roselle was harvested in the dry periods of growth which are desirable in the last month of growth. This result supports the findings of Tindal, (1983) who observed that rain or high humidity during the harvest time and drying can downgrade the quality of the calyces and reduces the yield. This might contributed to the good result obtained.

Table 1: Plant height, number of leaves, leaf length, leaf width and days to 50% flowering of Roselle as affected by sowing dates in 2009.

<i>Treatment (Sowing date)</i>	<i>Plant height (cm)</i>	<i>Number of leaves</i>	<i>Leaf length (cm)</i>	<i>Leaf width (cm)</i>	<i>Days to 50% flowering</i>
SD1	33.95	40.2	16.83	7.75	93
SD2	26.08	45.1	15.80	7.53	98
SD3	32.50	50.1	14.60	7.55	85
SD4	29.01	53.4	14.03	6.60	101
LSD (P=0.05)	1.85	3.14	NS	NS	0.77

KEY

SD1 = 15/7/2009

SD2 = 22/7/2009

SD3 = 29/7/2009

SD4 = 5/8/2009

SD = Sowing Date

LSD = Least Significant Difference

NS = Non-Significant

Table 2: Number of fruits, fresh calyx length, fresh and dry calyx yield of Roselle as affected by sowing date in Mubi 2009.

<i>Treatment (sowing date)</i>	<i>Number of fruits</i>	<i>Fresh calyx length (cm)</i>	<i>Fresh calyx yield (kg/ha)</i>	<i>Dry calyx Yield (kg/ha)</i>
SD1	134	5.8	139.59	81.03
SD2	128	4.4	112.02	67.11
SD3	121	3.9	60.69	4207
SD4	102	4.2	70.03	39.54
LSD (P=0.05)	4.46	0.09	2.48	1.08

KEY

SD1 = 15/7/2009

SD2 = 22/7/2009

SD3 = 29/7/2009

SD4 = 5/8/2009

SD = Sowing Date

LSD = Least Significant difference

Kg/ha = Kilograms per hectare

Conclusion

The need for a precision in establishing appropriate sowing date for high productivity in Northern Guinea Savanna is confirmed by the findings from this study. Based on the result of this research, the highest fresh (139.59kg/ha) and dry (81.03kg/ha) calyx yield of Roselle was recorded

with mid July sowing date. It is therefore recommended that the mid July sowing date (SD1) appears to be optimum since it gave the highest calyx yield. Planting of Roselle in mid July in Northern Guinea Savanna would result in high calyx yield but at the expense of longer days to flower compared to sowing early August.

Contribution of co-authors

Y. M. Kwaga – Conducted analysis of all the data

T. Clement – Conception of the trial and designed experiments

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