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Effect of Main Stem Cutting Height and Branch Purning on Seed Yeild and Quality of Corchorus Olitorius ev. 'Oniyaya'

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ABSTRACT

The effect of main stem cutting height and branch and pruning back on seed yield and quality of Corchorus olitorius (Cv. "Oniyaya") was studied at the Teaching and Research Farm of the Federal University of Technology Minna, during 2009 cropping season, seed of "Oniyaya", variety of Corchorus olitorius were steeped in hot water (at about 97°c) for five seconds to break dormancy. The seeds were then sown in plastic pots filled with top soil. Seedlings were in the nursery for four weeks before they were transported to the field. There were seven treatment viz: (i) uncut (control), (ii) 30cm stopping without pruning of primary branches, (iii) 30cm stopping plus cutting back of primary branches, (iv) 30cm stopping plus pinching of primary branches (v) 50cm stopping without pruning of primary branches, (vi) 50cm stopping plus cutting back of primary branches, and (vii) 50cm stopping plus pinching of primary branches. The treatments were arranged in the field. Using the Randomize Complete Block Design (RCBD) replicated thrice. Stem cutting significantly hastened flowering and reduced number of fruits from the main stem. Unpruned (control) plants produced significantly more primary branches and more fruits on the main than the cut plants. Generally, significantly higher number of fruits and greater seed yield were recorded in the unpruned plants. Next in performance were plants which main stem were cut at 50cm in combination with cutting back of primary branches.

INTRODUCTION

Corchorus olitorius (Jute Mallow), belongs to the family of the member *Tiliaceae.* It is known for its leaves that are used as a vegetable in West African. *Corchorus olitorius* is called Jews Mallow or Jute Mallow in English. The Yoruba of Nigeria a call it "ewedu", "Malafiya" in Hausa, Ahihara in Igbo and songhay of Mali call it "Fakohoy". Tindall (1968) considered it to have originated from India. However, Grubben (1977) stated that the main sources of these vegetable was in Southern China, that it was taken to India at its early date. It is grown worldwide in Africa. Malaysia, tropical Asia and Latin American. In Africa it's found in grassland, cultivated lands, and in near dams. Jute has been the integral part of bengalic culture which is shared by Bangladesh and western part of Bangal of India (Basu, *et al.,* 2005).

OBJECTIVE OF THE STUDY

In the context of the above, this study was designed to evaluate the effect of main stem cutting height, branch pruning and pinching on "Oniyaya" cultivar of *Corchorus olitorius.*

MATERIALS AND METHODS

The experiment was conducted at the Federal University of Technology Minna (9°40 N and 6°30 E), in the Southern Guinea savannah region of Nigeria during 2009 cropping season.

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Sources of Planting Materials

The seed of "oniyaya" variety of *corchorus olitorius* L were obtain from Crop Production Department Federal University of Technology Minna.

Nursery Establishment

About 50 g of seed of "Oniyaya" variety of *corchorus olitorius* L. were steeped in hot water at about 97° C for five seconds to break dormancy and immediately dip in cold water to bring down temperature of the seeds. Treated seeds were air dried and then sown into the soil in plastic pots.

Treatment, Experimental Design and Seedling Transplanting

The study was a factorial experiment with seven treatment combination. The seven treatments used in the study were:-

Uncut (control)
30 cm cutting plus no pruning
30 cm cutting plus branch cutting back
30 cm cutting plus tipping/pinching
50 cm cutting plus no pruning
50 cm cutting plus branch cutting back
50 cm cutting plus tipping/pinching

This gave a treatment combination of 21 (i.e. 7 x 3). The randomized complete block design (RCBD) was use with this three replication. The seedlings were transplanted at the age of four weeks at a plant to plant spacing of 50 cm on ridges made 75 cm apart. Each treatment were randomly allotted to a plots. Three replication were used.

Parameters of Study

The parameters of studies include, day to 50% flowering, number of primary branches per plant, number of secondary braches per plant, number of productive primary branches per plant, number of productive secondary branches per plant, number of fruits from main stem, number of fruits from primary branches per plant, number of fruits from secondary branches per plant, fruits weight per plot, fruit length, fruit, girth, seed yield.

RESULT

Days to 50% Flowering

Stem cutting significantly affected the number of days to 50% flowering (Table 1) Cutting at 30 or 50 cm significantly hastened flowering irrespective of pruning treatment compared to the uncut plant. Furthermore, flowering was significantly earlier (about 66 days) plants cut at 30 cm than in those that were cut at 50 cm (about 72 days).

Numbers of Primary Branches per Plant

Table 1 also shows that the number of primary branches was significantly affected by cutting/pruning treatment. Cutting at 30 cm significantly reduced the number of primary branches to about 11 compared to about 20 branches in uncut plant and from about 15-17 those cut at 50 cm. Though the number of primary branches in the uncut plants was higher

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than those obtained at 50 cm cutting height, there was no significant difference between the two values. Furthermore, there were no significant differences among branch cutting/pruning treatments within each main stem cutting height.

Number of Secondary Branches per Plant

The cutting back of the main stem in combination with the cutting back or pruning of the primary branches resulted in the production of significantly more secondary branches compared to what was obtained for the uncut plants. When main stem was cut back but without the cutting or pinching of the primary branches, the number of secondary branches produced was similar to what was obtained in the uncut plants. Overall, branching was best when the main stem was cut at 50cm combined with the cutting back of the primary branches.

Table 1: Influence of Main Stem Cutting Height and Branch Pruning on Flowering, the Number of Primary and Secondary Branches per Plants.

Treatment	Days to 50% flowing	Number of primary branches	Number of secondary branches
Uncut (control)	76a	19.7a	6.5d
30 cm cutting plus no pruning	66.0c	10.6d	4.1d
30 cm cutting plus branch cutting back	66.0c	11.2cd	16.1b
30 cm cutting plus tipping/pinching	65.3c	10.6d	13.3c
50 cm cutting plus no pruning	71.3b	14.5bc	4.9d
50 cm cutting plus branch cutting back	71.7b	17.1ab	19.5a
50 cm cutting plus tipping/pinching	71.7b	15.8b	18.3b

Number of Productive Primary Branches per Plant

The cutting of main stem at 30 cm height resulted in the production of significantly fewer productive primary branches than what was recorded from the uncut plants and in plants cut at 50 cm height. The number of productive primary branches was similar for the uncut plants and the plants that were cut at 50 cm in combination with the pruning or cutting back of primary branches. Branch pruning treatment did not **significantly affect this trait within each cutting height level.**

Number of Productive Secondary Branches per Plant

Significantly fewer secondary branches were productive when the main stem was not cut at all or when they were cut but the branches were not pruned (Table 2). Furthermore, main stem cutting at 30cm height followed by cutting back or pruning of primary branches gave the best performance.

Number of Fruits from Main Stem

Table 2 also shows that stem cutting reduced the number of fruits obtained from the main stem. Uncut plants produced significantly higher number of fruit (about 19) on the main stem compared to a range of about three to five and six to nine in 30 and 50 cm cutting height respectively. Generally, significantly more fruits were obtained or produced on the main stem when plants were cut at 50 cm than that of 30 cm.

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Table 2. The Influence of Stem Cutting and Branch Pruning on Some Reproductive Parameters

Treatment	Number of productive primary branches	Number of productive secondary branches	Number of fruits from main stem	Number of fruits from primary branches	Number of fruits from secondary branches	Fruits weight per plot	Fruits length	Fruits girth	Seed yield
1	13.8a	3.7c	19.2a	35.9a	5.4c	427.0a	4.9b	1.9a	192.3a
2	8.6c	3.2ed	2.7e	22.0b	3.6cd	22 1b	5 5a	2 0a	93.6b
3	10.2c	10.3a	3.6e	6.4c	19.0b	201.2b	4 5b	2.0a	83.7b
4	8.8c	10.6a	4.8de	6.5c	24.6a	146.1b	4.5b	2.0a	62.0b
5	12.0b	2.4d	6.0cd	24.6b	2.3d	200.8b	5 4a	2 0a	90.5b
6	13.7ab	8.5b	9.2b	32.2a	20.1b	271.1b	4 3b	2.0a	109.6b
7	12.ab	9.3b	7.5bc	7.2c	26.7a	216.6b	4.5b	2.0Sa	86.0b

Treatment

Uncut (control)
30 cm stopping without pruning of primary branches
30 cm stopping plus cutting back of primary branches
30 cm stopping plus pinching of primary branches
50 cm stopping without pruning of primary branches
50 cm stopping plus cutting back of primary branches
50 cm stopping plus pinching of primary branches

Number of Fruits from Primary Branches per Plant

The greater number of fruits from primary branches was produced by uncut plants but the value (about 36) was not significant different from that (about 32) obtained at 50 cm stem cutting height combined with branch cutting back. Performances at 30 and 50 cm stem cutting heights combined with no branch pruning was next best (about 22 and 25 respectively). Performances (about 6/7) of all other treatments were poor.

Number of Fruits Secondary Branches per Plant

Generally, significantly more fruits were produced on secondary branches when the main stems were cut at 30 and 50 cm combined with tipping/pinching of primary branches. Next in performance were plants in which main stem were cut at 30 and 50 cm combined with cutting back of the primary branches. Performances of all the other treatments which ranged from about 2 to 5 were significantly the poorest.

Fruits Weight per Plot

The fruits weight per plot (about 427 g) obtained when the main stem was not cut was significantly higher than in other treatment. The performances of the other treatments were not significantly different from each other.

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Fruit Length

Fruit were significantly longer in 30 or 50 cm cutting height without pruning than in other treatments, the performances of which were not significantly different from each other.

Fruit Girth

There were no significant differences in fruits girth among all treatments.

Seed Yield

Seed yield was significantly higher when main stem was not cut than in performance of which were not significantly different from each other.

DISCUSSION

Apical dominance is the central factor that determines branching pattern in plant. (Streck, 2005). Cline (2000) suggested that auxin acts as a repressor of buds outgrowth. According to McLucas (2007) removing the apex (cutting the tip) of a stem stops the auxin (hormone) flow and allows the buds behind the growing tip to develop into branches. Jone *ET, al.,* (1989) stated that normal method of branch production is by pruning. Cutting height are designed to maximize yield while maintaining high quality and stand longevity (Daniel *et al.,* 2007). The result from this study however revealed **that main** stem cutting **significantly reduced the number** of primary branches **per plant. This is** contrary to expectation based on the **studies** reported above. Ahmed *et* **al., (2008) reported that** stem-cutting-back **significantly** increased number **of primary** branches. The report of Ahmed *et al.,* (2008) did not however indicate **if fertilizer** was applied and at what rate. **In this** study NPK 15:15:15 was **applied at** the rate **of 400kg ha^{-1}. Differences in** mother plant environment under which Ahmed *et al.,* **(2008)** conducted **their study** may **differ** from **that of the present** study which might have been responsible **for the differences** recorded. However, in agreement with the result in this study **Olasantan (1986) and** Schippers **(2000) also** reported a decrease in the number **of** branches when epical **debudding** was done in **okra. Cutting** back **of the** main stem in combination with cutting back or pruning **of** the primary branches significantly induced greater production **of** secondary branches **in** this study this would be of economic benefit to leaf producers **of** the crop who normally harvest by cutting. Stem cutting back resulted in earlier flowering in this study. This is in agreement with the report of Ahmed *et al.,* (2008) on the same crop. This trend has also been reported in bitter leaf (Schippers, 2000). Pod and seed yield were significantly better on the un-pruned (control) than in the pruned treatment. This could be attributed to the fact that un-pruned plants produced significantly more inches than other treatments. The number of fruits from primary branches did not differ significantly between un-pruned and plants pruned at 50 cm. Perhaps, a higher cutting height may improve fruits and seed yields. Olasantan (2006) recorded better shoot yield when pumpkin was pruned at 30 cm than at 60 cm. Zinati (2001) reported that in Amaranthus, cutting the plant main stem 30 and 50 cm above the soil surface reduced total plants biomas, whereas cutting at 90 cm increased plant biomass and also seed yield.

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CONCLUSION

It is concluded in this study that cutting of "Oniyaya" variety of ***Corchorus olitorius*** plants resulted in early flowering. It is also concluded that un-pruned plants produced the higher number of fruits and seed.

RECOMMENDATION

From the result of this study, it is recommended that for optional seed yield and quality of "Oniyaya" variety of ***Corchorus olitorius,*** plant should be left un-pruned or pruned at 50 cm in combination with cutting back of the primary branches, perhaps a higher cutting may improve fruits and seed yield.

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