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PROCEEDING OF THE 25TH ANNUAL CONFERENCE OF THE HORTICULTURAL SOCIETY OF NIGERIA

HELD AT:

NATIONAL HORTICULTURAL RESEARCH INSTITUTE
IDI-ISHIN, JERICHO RESERVATION AREA, IBADAN.

4TH - 8TH NOVEMBER, 2007

EDITED BY:

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CROP PRODUCTION AND SOIL AMENDMENT

Effects of variety and cutting height on seed yield in *Corchoru olitorius*. L

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Abstract

The effect of variety and cutting height on seed yield and quality of *Corchorus olitorius* was studied during 2006 cropping season. Seeds of varieties 'Oniyaya' and 'Amugbadu' were steeped in water at about 97°C for 5 seconds to break dormancy and then sown in the nursery. Seedlings were in the nursery for four weeks before they were transplanted on ridges 75cm apart; inter plant spacing was 40cm. The layout was a Randomized Complete Block Design (RCBD). The five cutting heights used were uncut (control), 50cm, 40cm and 20cm. Harvesting was done when about 85% of the fruits on plants had turned brown. Stem-cutting significantly hastened flowering and enhanced branching. 'Oniyaya' variety produced significantly more branches than "Amugbadu". Stem-cutting significantly reduced the number of fruits on the main-stem. There was no significant interaction effect of variety and cutting height on number of fruits and seed weight. Whereas cutting heights of 50cm and 40cm might be optimum for 'Oniyaya', it is not advisable to cut below 50cm in 'Amugbadu'. Seeds were tested to determine their viability at 0, 3, 6 and 9 months. When germination was tested following hot-water steeping, a percentage of about 95% was recorded in both varieties. Test carried out without hot-water treatment revealed germination percentage of about 30% which showed that the seeds were dormant. The value however, increased to about 72% to 62% in both 'Oniyaya' and 'Amugbadu' respectively over the storage period.

Introduction

In *Corchorus* production, yield of about 100g of seed/plant is possible depending on the number of seeds per plant and fruit length (Schipper, 2000). Seed yield of about 600kg/ha has been recorded in Kenya (Onyango, 2000). Cutting height is designed to maximize yield while maintaining high quality seeds and stand storage longevity. Working with alfalfa, Belesky and Fedders (1997) stated that plant stem cut at 3 inches produced more branches than at 1-2 inches. Mendoza (1988) reported that in vegetables, stem cutting increased plant yield under good ecological conditions.

Ajala (2006) stated that high germination percentage is an essential characteristic of high seed quality. Several studies carried out showed that seed quality can largely be influenced by a wide range of environments such as seeds priming (Tesnier *et al.*, 2002; Hampton, 2003; Adebisi, 2004). Bigger seeds of *Corchorus olitorius* have been reported to germination faster and produce lager seedlings than small seeds. *Corchorus* seeds exhibit some form of dormancy, possibility associated with the seed coat. Therefore, some form of scarification is usually needed to make hard seed coats permeable to water or grases. This can be accomplished by mean of mechanical, thermal or chemical treatments (Mmolawa, 1987). Oladiran (1986) reported that when seeds of *Chorchorus olitorius* were steeped in boiling water for 5 seconds, dormancy was eliminated, Akinola *et al.* (2000) reported that wild sunflower seeds soaked in hot water gave

more than 65% germination. It is believed that hot water, break physical (seed coat dormancy in seeds by which is a form of thermal scarification (Budy *et al.*, 1986. Hot water may also have other influences such as causing thermal shock to the embryo, or leaching of inhibitors.

Some period of seed storage has been reported to break dormancy in seed. Oladiran and Agunbiade (2000) reported a general improvement in pepper seed germination within six weeks of storage.

The objective of this study was to determine the effects of the heights at which the stem of "Oniyaya" and "Amugbadu" varieties of *Corchorus olitorius* if cut would have on expected high seed yield and quality.

Materials and Methods

The experiment was conducted at the Federal University of Technology. Minna, during 2006 growing season. Two varieties of *Chorchorus olitorius* ("Oniyaya" and "Amugbadu") were used. About 50g of seeds were steeped 97°C water for 5 seconds to break dormancy and immediately steeped in cold water to bring down the temperature of the seeds (Oladiran, 1986). Seeds were air-dried and sown into topsoil contained in polythene bags. Seedlings were transplanted four weeks later on ridges made 75cm apart with intra-row spacing of 40cm on plots allotted to plants to be cut at 20cm, 30cm, 40cm and 50cm. Plants to be left uncut were used as the control. The layout was a Randomized Complete Block Design (RCBD) with three replications. There were 24 plants per plot of 3m x 3m. All necessary cultivation practices such as weeding, pest control, etc, were carried out.

Fruits of "Oniyaya" and "Amugbadu" were harvested respectively at 145 and 173 days after planting when about 85% brown in colour. Oladiran (1986) reported that germination was best at this colour stage. The fruits were dried further by spreading under shade. Data from 12 plants in the middle rows, were collected on parameters such as days to 50% flowering, total number of branches per plant, number of productive branches per plant, numbers of fruits on the main stem per plant, number of fruits on all branches per plant, and seed weight per hectare. The data collected were subjected to Analysis of Variance using Minitab 14 packed.

The viability of the seeds stored in paper envelopes at room temperature was tested after harvest at three, six and nine months of storage using four replicates of 50 seeds each from all treatment combinations with and without-water treatment. These seeds were spread on distilled water – moistened absorbent paper in 9cm dishes, covered and incubated at 30°C. Germination records were taken over 28 days. The data were expressed in percentages.

Results

Stem cutting significantly ($P<0.05$) hastened flowering (Table 1). Whereas uncut plants of "Oniyaya" flowered about 77 days after transplanting, cutting at 20cm reduced flowering time to about 61 days. The same trend was recorded in "Amugbadu". Stem at heights 30 to 50cm significantly enhanced branching in the two varieties (Table 2). There was no significant difference between the uncut plants and those stopped at height 20cm. 'Oniyaya' produced significantly more branches than 'Amugbadu'. Whereas all the branches produced by plants cut at heights 50cm, 40cm, 30cm and 20cm were productive in all varieties, only about 60% of the branches produced by uncut plants were productive. There was no significant difference between the varieties (Table 3). Stem cutting significantly reduced the number of fruits on the main stem in both varieties (Table 4). Uncut plants had the highest value (8) while values from cut plants ranged from about 1 – 4, Table 5 showed that stem cutting resulted in

significantly higher fruit yield from the branches in both varieties. Fruits yield was higher in 'Oniyaya' than in 'Amugbadu'. Both variety and stem cutting affected seed yield significantly (Table 6). Stem cutting at 50cm out-yielded all others (341kg/ha), while yield was significantly lower in uncut plants (127kg/ha) than in any of the cut plants. Furthermore, 'Oniyaya' gave significantly higher yield (301kg/ha) than 'Amugbadu' (163kg/ha).

Figures 1a – 4b show the germination behaviour of seeds with or without hot – water treatment before and following storage. Prior to, seed germination in the two varieties ranged between about 25% to about 40% without hot – water treatment, whereas with hot – water steeping, germination was about 94 to 97% (Figs 1a and b). This shows that freshly harvested seeds were dormant. Between three and six months of storage, germination improved without hot – water steeping to a maximum of about 79% and 68% in 'Oniyaya' and 'Amugbadu' respectively. Germination following hot – water steeping remained high (Fig. 2a – 3b). By the ninth month of storage however, a slight decline in germination had set in when hot – water steeping wast not done (Figs 4a and b). The general outlook was that seeds of 'Amugbadu' were more dormant than those of 'Oniyaya'. Also, seeds from stopped plants appear to be shallower in dormancy.

Discussion

Plants generally are known to produce more branches when stopped. This is due to the removal of apical dominance thereby allowing the growth of lateral branches. The significant increase in lateral branches of *Corchorus* in the present experiment must have been responsible for the high yields in cut plants. Plant – stopping is known to result in yield maximization. The significant differences in fruit and seed yields in the *Corchorus* varieties used in this study corroborate results obtained by other workers. Akoroda (1984) reported that *Corchorus* seed yield may be affected by cultivars. Stem cutting at 50cm gave highest seed yields of about 450kg 229kg/ha for 'Oniyaya' and 'Amugbadu' respectively in this study. Though, these figures are lower than the 600kg/ha reported in Kenya (Onyango), they are higher than the average yield of 250kg/ha reported by FAO (2000)

The dormancy exhibited by seeds in this study is a common phenomenon (Oladiran, 1986). Oladiran and Agunbiade (2000) reported about improved germination of pepper seeds following six weeks of storage. Varietal differences in dormancy depth as recorded in 'Oniyaya' and 'Amugbadu' has been reported in other species (Chang, 1988).

It is concluded that the stopping of *Corchorus* plants resulted in earliness of flowering, enhanced branching and increased fruit and seed yields. Branching, fruit and seed yields were also affected by variety. Fro optimal seed yield, *Corchorus* plant should be stopped at a height of about 50cm. For optimum germination, seeds should be steeped for 5 seconds at about 97°C.

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Table 1: Effects of variety and cutting heights on days to 50% flowering of *Corchorus olitorious*

Variety	Cutting Height (cm)				
	Uncut	50	40	30	20
	Days to 50% flowering				
'Oniyaya'	77	71	67	65	61
'Amugbadu'	74	70	68	65	62
Mean	75.5	70.5	67.5	65	61.5

LSD $_{5\%}$ cutting height = 1.13

Table 2: Effects of variety and cutting heights on total number of *Corchorus olitorious.*

Variety	Cutting Height (cm)					Mean
	Uncut	50	40	30	20	
	Total number of branches per plant					
'Oniyaya'	4.3	7.3	6.0	6.0	5.0	5.7
'Amugbadu'	3.0	5.3	4.3	4.3	3.3	4.4
Mean	3.7	6.3	5.2	5.2	4.2	

LSD $_{5\%}$ cutting height = 1.10

LSD $_{5\%}$ variety = 0.9

Table 3: Effects of variety and cutting heights on number of productive *Chorchorus olitorious*

Variety	Cutting Height (cm)				Mean
	Uncut	50	40	30	20

	Number of productive branches per plant					
'Oniyaya'	2.3	7.3	6.0	6.0	5.0	5.3
'Amugbadu'	2.3	5.3	6.0	4.3	3.3	4.3
Mean	2.3	6.3	6.0	5.2	4.2	

LSD $_{5\%}$ cutting height = 1.11

Table 4: Effects of variety and cutting heights on number of fruits on the main stem of *Corchorus olitorious*

Variety	Cutting Height (cm)					Mean
	Uncut	50	40	30	20	
	Number of fruits on main-stem per plant					
'Oniyaya'	8.0	4.0	2.7	1.3	1.0	3.4
'Amugbadu'	8.3	2.3	2.0	2.0	1.0	3.1
Mean	8.2	3.2	2.3	1.7	1.0	

LSD $_{5\%}$ cutting height = 0.51

Table 5: Effects of variety and cutting heights on number of *Corchorus olitorious* fruits on all branches.

Variety	Cutting Height (cm)					Mean
	Uncut	50	40	30	20	
	Number of fruits on all branches per plant					
'Oniyaya'	64.3	278.7	260.3	165.0	147.7	183
'Amugbadu'	69.0	129.3	75.0	67.7	43.3	76.9
Mean	66.7	204.0	167.7	116.4	95.5	

LSD $_{5\%}$ cutting height = 7.1
LSD $_{5\%}$ varieties = 10.3

Table 6: Effects of variety and cutting heights on *Corchorus olitorious* seed weight.

Variety	Cutting Height (cm)					Mean
	Uncut	50	40	30	20	
	Seed weight (kg/ha)					
'Oniyaya'	86	453	423	324	220	301