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EFFECT OF PRE-EMERGENCE HERBICIDES ON THE GROWTH, YIELD AND DRAWING QUALITY OF JUTE MALLOW (*CORCHORUSOLITORIUS*)

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Abstract: Field experiment was conducted at the Teaching and Research Farm, Ladoke Akintola University of Technology, Ogbomoso to evaluate pre-emergence herbicides for weed Control and effects on the drawing quality of *Corchorusolitorius*in a Randomized Complete Block Design with three replications. The treatments were metolachlor, pendimethalin and a mixture of the two herbicides in the ratio 1:1. A control to which no herbicide was added was included as the 4th treatment.
Result showed that the growth and yield parameters of *Corchorusolitorius*across the treatment and control were not significantly different (P=0.05) at different growth periods. However, the highest vegetative yield (1.55kg/m^2) was obtained under pendimethalin when compared with other herbicide treatments and control. There was a significant (p=0.05) difference in weed control effectiveness of the herbicides compared to the control though there was no significant difference across the herbicide treatments at 4 week after planting. The drawing quality of *C. olitorius*was significantly affected (P=0.05) by the treatments. The herbicides enhanced this characteristic compared to the control. Drawing quality followed the order: pendimethalin>metolachlor> mixture>control.
Keywords: *Corchorusolitorius,* weeds, Pendimethalin, Metolachlor, Drawing quality.

INTRODUCTION

Jute mallow *(Corchorusolitorius)* is one of the popular tropical leaf vegetables in Africa, Asia and some part of the Middle East. It plays a vital role in the diet of many nations. *C. olitorius*is widely grown in the tropics for the mucilaginous characteristics (drawing quality) of the immature green pods and leaves either freshor sun dried. *C. olitorius*was proposed to have originated from Asia and Africa. It was however found in many parts of Australia and Africa especially in south-western Nigeria. Aside the medicinal and dietary quality, Corchorus is appreciated most importantly for its mucilaginous characteristics which enhance and facilitate swallowing of solid food including pounded yam, eba, amala and fufu among others.*C. olitorius*contains Calories (7.3k/cal), Protein (3.6g), Lipid (0.6g), Calcium (298mg)

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Iron (11mg), Carotene (6400mg) and Vitamin C (64mg) (BJRI, 2003). These qualities are widely appreciated in West Africa where the shoot and leaves are added to stew or soup to eat starchy paste. In India, the shoots are cooked with rice (Kirtikar and Basu, 1976).

*C. olitorius*had been reported to be demulcent, deobstruent, lactagogue, purgative and tonic, Tussah jute is a folk remedy for aches and pains, dysentery, enteritis, fever, pectoral pains, and tumors (Duke and Wainn, 1981, List and Horhammer, 1979). Inspite of the popularity of this crop in many countries of the tropics however, little research and developmental works have been done to improve its culture and production (Oomen and Grubben, 1978).

Weeds constitute a major problem of C. *olitorius*due to slow juvenile growth. Also, the common method of sowing (Broadcasting) makes the conventional method of using hoe and cutlass a difficult and time consuming task. Chemical control of weeds (herbicide) has been found effective for weed control in tropical crops over the years. Pre-emergence herbicides which are soil active and are applied after planting the crop but before the crop and weed emerge is a very prominent group of herbicides in crop production. These allow the crop to have a lead start ahead of the weed. Since *C. olitorius*is predominatly grown by peasant farmers, very littleinformation is available on the use of chemicals for weed control in the crop.

Metolachlor(2-chloro-N-(2-ethyl-6-methylphenyl)-N-(2-mehtoxy-1-methylethyl) acetamideis mostly used in the tropics as a pre-emergence herbicide for weed control. It is a soil applied herbicides used for the control of grasses and some annual broad leaf weeds. A very common and easily handle herbicide used for weed control in broad leafed crops including cowpea, okra, soyabean, groundnut, etc. metolaclor is compatible with most other herbicides with which it is mixed to broaden the scope of weeds controlled. The popularity of the herbicide centresaround its effectiveness, low dosage (1 litre/ha) and most importantly, very low persistence.

Pendimethalin (N-(1-ethylpropyl)-3,4-dimethyl-2,6-ditrobenzenamine) is used as pre-plant incorporated pre-emergence and also as a post-emergence herbicide for grass weed control in many crops including maize, sorghum, cowpea, soybean, okra etc. The fact that this herbicide can be used as pre-emergence make it more popular than the other dinitroaniline (Akobundu, 1987). Pendimentalin is especially effective against *Rottboelliacochinchinesis* and *Digitariahorizontalis.* It is a low persistent herbicide. The objective of this research work therefore was to evaluate the use of these pre-emergence herbicides for weed control on

Chocorusolitorius beds with a view to ascertaining suitability and assessing their effect on the drawing quality of the plant.

Materials and Method

The study was carried out during the rainy season of year 2012 at the Teaching and Research Farm of Ladoke Akintola University of Technology, Ogbomoso in the derived Guinea Savanna zone of Nigeria. The experimental plot was disc ploughed and manually leveled before lining out. The plot size was 18mx13m. Twelvebeds (3mx3m) were made with a spacing of 2m in between the beds. Each of the three replicate of the experiment comprised of four beds. The replicates were separated by 2 m spacing. There were four treatments, Control (Manual weeding at 2, 4 and 6 weeks after planting (WAP) by hand pulling), Metolachlor (50ml per l0 litres of water i.e. 1litres/ha), Pendimethalin (50ml per l0 litres of water i.e. 1litres/ha), Mixture (25ml each of metolachlor and pendimethalin per l0 litres of water and replicated three times. The application was done using a knapsack sprayer Cp3, with 20 litre capacity and calibrated to deliver at 200litre/ha. Herbicide was applied 2 days after drilling to a rain moistened soil.

The seeds of *C. olitorius* were steeped in hot water and allowed to cool and dry under shade before planting, to break the seed dormancy. Planting was done by drilling at a spacing of 15cm between rows. At 3 WAP, the seedlings were thinned to a spacing of 5cm within rows and 2 plants per stand. Two plantings were done. The first was done in April and second in the month of June 2012.

Data were collected for Plant height (using metre rule), Stem height (using metre rule), Number of leaves (by physical counting), Weed population (using $1m^2$ quadrat), Stem girth (using venier calipers), Number of branches (by physical counting), Leaf area (using metre rule), Vegetative yield at 6 WAP (by weighing the cut part), Number of pods (by physical counting), Number of seeds (by physical counting), Weight of seeds (by weighing), Drawing quality (using a taste panel that comprising six people). The taste panel followed the score chart 5- excellent drawing, 4- very good drawing, 3- good drawing, 2-fair drawing, 1- poorly drawing. Harvesting for test of drawing quality was done at 6 WAP.

Mean data across the two plantings were analysed using the relevant analysis of variance (ANOVA) while significant means were separated using the Duncan's Multiple Range Test (DMRT).

Result

The effect of pre-emergence herbicides on the growth parameters of *Corchorusolitorius*is presented in Table 1. The growth parameters indicate were not significantly (p = 0.05) affected by treatments across the growth periods. Similarly, the herbicide treated plants were not significantly different from the control in terms of the growth parameters. The herbicide mixture has the highest value in most of the parameters measured, though, the values were not statistically (p = 0.05) superior to those of other treatments and control.

The effect of pre-emergence herbicides on the vegetative yield of *Corchorusolitorius*is presented in Table 2. There were no significant treatment effect on the shoot weight of *Corchorusolitorius*compared to the control. The highestyield (1.55kg/m^2) was obtained under pendimethalin while the smallest (1.06kg/m^2) was obtained under the mixture of metolaclor and pendimentalin. These values were not statistically different from those ofmetolachlor (1.4kg/m^2) and control (1.06kg/m^2).

The effect of pre-emergence herbicides on pod and seed yield of *Corchorusolitorius*as presented in Table 3 also showed that there were no significant treatment effect between the herbicide treated plots and control. Similarly, the treatments were not significantly different from one another. The highest number of pods per plant was obtained from pendimethalin treated plants (67) which is not significantly different from 62, 58 and 47 recorded for metolachlor, mixture and control respectively. The highest number of seeds/pod, (189) was obtained under the control treatment which was however, not statistically superior to those of pendimentalin (180), metolaclor (174) and the mixture (174). The weight of seeds/pod was similarly not affected by the treatments.

The efficiency of pre-emergence herbicides on weed population on *Corchorus olitorius* plot is presented in Table 4. While there were no significant (P = 0.05) effect of the herbicides treatments on weed population at 2WAP, weed populations were significantly higher on the control plot than the herbicide treated plots at 4 WAP.

Pre-emergence herbicides significantly affected the drawing quality of *Corchorus olitorius*(Table 5). The drawing quality under pendimethalin(4.5) was superior to metolachlor (4.0) followed by mixture (3.6) and control (2.3).

Discussion and Conclusion

The results of the experiment showed that the herbicides adequately reduced both seedling recruitment and growth of weeds on *Corchorus* plots thereby allowing adequate growth due to reduced competition from weeds. Similarly, the cherished characteristics of *corchorus*,

mucilage, was not compromised, rather, it was enhanced using the herbicides. Thus, since the herbicides enhanced both the vegetative yield and the drawing quality, it could safely be concluded that these herbicides could be a way out of the perennial weed problems confronting *corchorus* growers. Furthermore, the successful employment of these herbicides for weed control in *corchorus* might enable growers to expand their production for more gains. The reduction in the drudgery associated with weed control, timely weed control and cost effectiveness occasioned by the use of herbicides (Akobundu, 1987) are likely to encourage more farmers to engage in corchorus production.

Table 1: Effect of pre-emergence herbicides on the growth parameters of *Cor chorus olitorius.*

Treatment	Plant height (cm)		Stem height (cm)	Stem Girth (cm)		Number of leaves		Leaf area (cm^2)		Number of branches
	4 WAP	6 WAP	6 WAP	4 WAP	6 WAP	4 WAP	6 WAP	4 WAP	6 WAP	6 WAP
Metolachlor	17.4a	48.1a	38.3a	0.4a	0.6a	9a	57a	20.1a	72.1a	14a
Pendimethalin	15.2a	49.9a	39.3a	0.4a	0.7a	9a	61a	24.9a	75.4a	14a
Mixture	17.8a	51.7a	41.5a	0.4a	0.7a	10a	64a	20.4a	75.6a	15a
Control	19.9a	50.3a	41.0a	0.3a	0.6a	9a	60a	25.5a	67.7a	15a

Mean followed by the same superscript along the column are not significantly different (P=0.05) by DMRT.WAP = Weeks after planting

Table 2: Effect of pre-emergence herbicides on the vegetative yield of *Corchorusolitorius*

Treatment	**Vegetative yield (kg/m^2)**
Metolachlor	1.40a
Pendimethalin	1.55a
Mixture	1.05a
Control	1.06a

Means followed by the same superscript along the column are not significantly different (P=0.05) by DMRT.

Table 3: Effect of pre-emergence herbicides on pod and seed yield of *Corchorusolitorius*

Treatment	Number of pod/plant	Number of seeds/pod	Weight of seeds/pod (g)
Metolachlor	62a	174a	l.14a
Pendimethalin	67a	180a	1.22a
Mixture	58a	174a	1.12a
Control	47a	189a	1.2a

Meansfollowed by the same superscript along the same column are not significantly different (p=0.05) by DMRT.

Table 4: Effect of pre-emergence herbicides on weed population on *Corchorusolitorius*plot

Treatment	Weed Density/m^2	
	2 WAP	4 WAP
Metalolachlc	18a	12b
Pendimethal	16a	20b
Mixture	16a	22b
Control	21a	36a

Mean followed by the same superscript along the same column are not significantly different (P=0.05) by DMRT.WAP = Week after planting

Table 5: Effect of pre-emergence herbicides on the drawing quality of Corchorusolitorius

Treatment	Drawing quality
Metolachlor	4.0b
Pendimethalin	4.5a
Mixture	3.6c
Control	2.3d

Mean followed by the same superscript along the same column are not significantly different (P=0.05) by DMRT.

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