

Original Research Article

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Effect of Weed Management in Yield Attributes of *Manihot esculenta* Crantz (Cassava)

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ABSTRACT

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Weed management in farmer's cassava (*Manihot esculenta* Crantz) field was carried out during 2017 to assess the weed control and yield characteristics of cassava in eight different treatments (T1-T8) including weedy check which served as control. The treatments consisted of weedy check (control, T1), weed free (hand weeding as and when required, T2), pendimethalin @ 1.5 kg/ha (T3), pendiplus @ 1.50 kg/ha (T4), imazethapyr @ 80g/ha (T5), pendimethalin @ 1.5 kg/ha + hoeing and earthing up (60 DAP) (T6), pendiplus @ 1.50 kg/ha + hoeing and earthing up (60 DAP) (T7) and imazethapyr @ 80g/ha + hoeing and earthing up (60 DAP) (T8). The abundant weeds in the field were *Boerhavia diffusa*, *Cyperus rotundus*, *Cyanodon dactylon*, *Phyllanthus maderaspatensis*, *Chloris barbata* and *Euphorbia hirta*. The yield performance was higher in T2 followed by T6, T3, T8 and T7 where the tuber yield was 23759.46, 22758.17, 22408.53, 21284.60 and 20618.76 kg/ha respectively.

Introduction

In tropical regions, cassava (*Manihot esculenta* Crantz) plays an important role in food security and poverty alleviation (Parkes *et al.*, 2013). Cassava is rich in carbohydrates and sustainably contributes to nourish millions of people because of its availability over the year (Hongbété *et al.*, 2011; Sanoussi *et al.*, 2015). Many elite varieties have been identified and used worldwide (Gbessovi *et al.*, 2016; Kombate *et al.*, 2017). Weed management in agriculture is very important and difficult task for all kinds of crops (Dash *et al.*, 2018; Kumar *et al.*, 2018). The present

scenario of high wages of labourers and also its scarcity particularly during peak periods and drudgery it seems to be imperative to go for chemical weed control due to its edge over manual weeding to overcome these problems (Singh *et al.*, 2018). Aiyelari *et al.*, (2017) concluded that although application of diuron at 2.25 kg a.i ha⁻¹ gave the optimum weed control, it may be necessary to tank mix diuron at reduced rate with other compatible herbicides to broaden the spectrum of weed control.

Weed competition is one of the most important factors in limiting the yield of crops.

The effective control of weeds in rice could be achieved with pre-emergence herbicide use of pretilachlor, penoxsulam and pyrazosulfuron. Among the post emergence herbicides use of chlorimuron-ethyl + metsulfuron-methyl, ethoxysulfuron, bispyribac sodium gives promising results (Kabdal *et al.*, 2018). From this study, it could be concluded that under transplanted rice in sodic soil, pre emergence application of bensulfuron methyl + pretilachlor at 60 + 600 g a.i. ha⁻¹ on 3 DAT fb hand weeding on 40 DAT resulted in increased yield attributes and nutrient uptake by rice. In cassava, it has been reported that weed control by hoe weeding and earthing up alone may increase the cost of production because of higher labour requirement. However, it was better to practice application of pre emergent herbicides like pendimethalin along with hoeing and earthing up at 60 DAP for effective weed control and reduction in cost of cultivation (Reshma *et al.*, 2016). In the present study, the chemical weed control with pendimethalin, imazethapyr and pendiplus on pre-emergence application, hoeing and earthing up after 60 days have been studied to find out the different treatments on yield characteristics of cassava and weed control in farmer's field.

Materials and Methods

The experiment was carried out at the local farmer's field using the experimental design adopted was randomized block design (RBD) with eight treatments and three replications. The treatments consisted of weedy check (control, T1), weed free (hand weeding as and when required, T2), pendimethalin @ 1.5 kg/ha (T3), pendiplus @ 1.50 kg/ha (T4), imazethapyr @ 80g/ha (T5), pendimethalin @ 1.5 kg/ha + hoeing and earthing up (60 DAP)(T6), pendiplus @ 1.50 kg/ha + hoeing and earthing up (60 DAP) (T7) and imazethapyr @ 80g/ha + hoeing and earthing

up (60 DAP) (T8). Vermicompost @ 6.5 t/ha was applied basally at the time of land preparation. Nitrogen, phosphate and potash @ 100:100:100 kg/ha was applied in three splits, at land preparation and two and three months after planting. The hoeing and earthing up was done 60 DAP. The crop was harvested after six months after planting and the yield characteristics and final weed numbers were counted and the data were subjected to analysis of variance (ANOVA). Benefit –cost ration (BCR) was worked out based on the prevailing market price.

Results and Discussion

The results on the yield characteristics of cassava in different treatments are shown in Table 1. The lowest yield of 11610.15 kg/ha was recorded in T1. A maximum yield performance was found in T2 followed by T6, T3, T8 and T7 where the tuber yield was 23759.46, 22758.17, 22408.53, 21284.60 and 20618.76 kg/ha respectively. The total number of tubers per plant was 8.72 in T2 followed by 8.21 in T7 which received pendiplus @ 1.50 kg/ha + hoeing and earthing up (60 DAP). The length of the tuber was 45.91 cm in Weed free (Hand weeding as and when required, T2), followed by T7 [pendiplus @ 1.50 kg/ha + hoeing and earthing up (60 DAP)]> 43.58 in T8 which received imazethapyr @ 80g/ha + hoeing and earthing up (60 DAP). The BCR ranged from 1.22 – 2.33 in the treatments. The BCR was 1.22, 1.73, 2.03, 1.82, 1.80, 2.33, 1.93 and 2.23 respectively in T1, T2, T3, T4, T5, T6, T7 and T8 respectively. The results showed that the hand weeding treatment had effective yield characteristics and very closely followed by pendimethalin @ 1.5 kg/ha with pre-emergence application (T3). The weed count at harvest showed greater reduction in the treatments T8 and T6 followed by other treatments (Fig. 1).

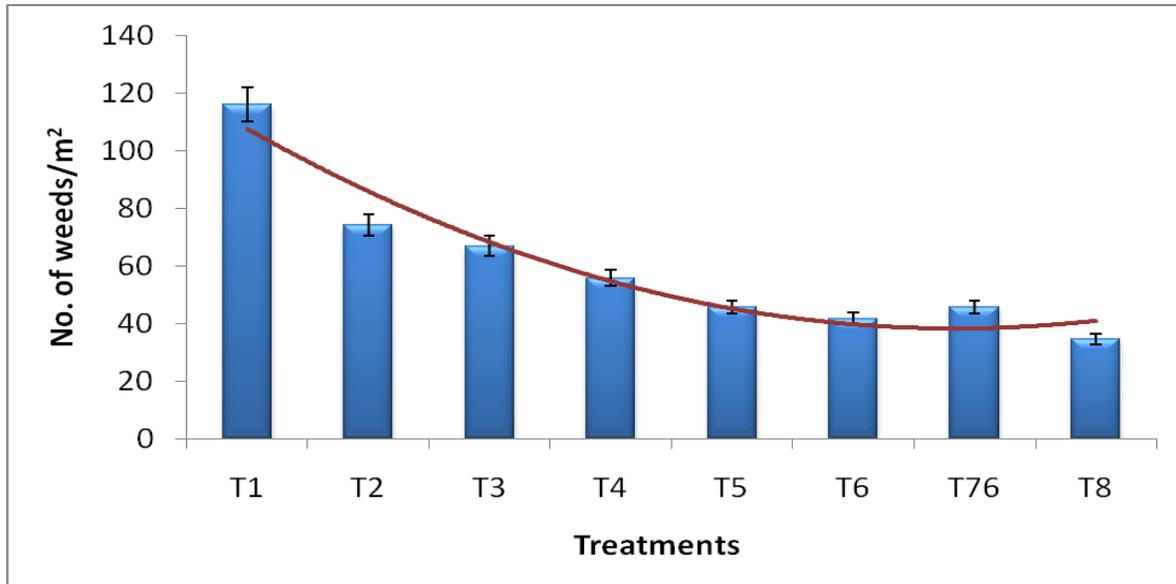
Table.1 Effect of different treatments on yield characteristics of cassava and weed count

Treatments		No. of tubers/plant	Length of tuber (cm)	Yield (kg/ha)	BCR
T1	Weedy check (Control)	4.56	23.82	11610.15	1.22
T2	Weed free (Hand weeding as and when required)	8.72	45.91	23759.46	1.73
T3	Pendimethalin @ 1.5 kg/ha (PRE)	7.60	39.02	22408.53	2.03
T4	Pendiplus @ 1.50 kg/ha (PRE)	6.89	35.67	19354.98	1.82
T5	Imazethapyr @ 80g/ha (PRE)	7.20	33.75	19762.39	1.80
T6	Pendimethalin @ 1.5 kg/ha + Hoeing and earthing up (60 DAP)	7.60	40.54	22758.17	2.33
T7	Pendiplus @ 1.50 kg/ha + Hoeing and earthing up (60 DAP)	8.21	45.61	20618.76	1.93
T8	Imazethapyr @ 80g/ha + Hoeing and earthing up (60 DAP)	7.90	43.58	21284.60	2.23

Table.2 Commonly found weeds of cassava field

Sl. No.	Name of the weed	Family
1.	<i>Almania nodiflora</i>	Amaranthaceae
2.	<i>Alternanthera pungens</i>	Amaranthaceae
3.	<i>Boerhaavia diffusa</i>	Nyctaginaceae
4.	<i>Cenchrus ciliaris</i>	Poaceae
5.	<i>Chloris barbata</i>	Poaceae
6.	<i>Cyanodon dactylon</i>	Poaceae
7.	<i>Cyperus rotundus</i>	Cyperaceae
8.	<i>Dactyloctenium aegypticum</i>	Poaceae
9.	<i>Digera muricata</i>	Amaranthaceae
10.	<i>Euphorbia hirta</i>	Euphorbiaceae
11.	<i>Glinus lotoides</i>	Molluginaceae
12.	<i>Oldenlandia corymbosa</i>	Rubiaceae
13.	<i>Phyllanthus amarus</i>	Euphorbiaceae
14.	<i>Phyllanthus maderaspatensis</i>	Euphorbiaceae
15.	<i>Portulaca oleraceae</i>	Portulaccaceae
16.	<i>Spermacoce hispida</i>	Rubiaceae
17.	<i>Trianthema portulacastrum</i>	Aizoaceae
18.	<i>Tribulus terrestris</i>	Zygophyllaceae
19.	<i>Trichodesma indicum</i>	Boraginaceae
20.	<i>Tridax procumbens</i>	Asteraceae

Fig.1 Weed count at harvest of cassava in different treatments. Error bars indicate standar deviation. Trend line shows the decline in number of weeds in comparison with weed check control



There were more than twenty weeds commonly found in the study plots which were *Almania nodiflora* (Amaranthaceae), *Alternanthera pungens* (Amaranthaceae), *Boerhaavia diffusa* (Nyctaginaceae), *Cenchrus ciliaris* (Poaceae), *Chloris barbata* (Poaceae), *Cyanodon dactylon* (Poaceae), *Cyperus rotundus* (Cyperaceae), *Dactyloctenium aegypticum* (Poaceae), *Digera muricata* (Amaranthaceae), *Euphorbia hirta* (Euphorbiaceae), *Glinus lotoides* (Molluginaceae), *Oldenlandia corymbosa* (Rubiaceae), *Phyllanthus amarus* (Euphorbiaceae), *Phyllanthus maderaspatensis* (Euphorbiaceae), *Portulaca oleraceae* (Portulaccaceae), *Spermacoce hispida* (Rubiaceae), *Trianthema portulacastrum* (Aizoaceae), *Tribulus terrestris* (Zygophyllaceae), *Trichodesma indicum* (Boraginaceae) and *Tridax procumbens* (Asteraceae) (Table 2). The studies by other researchers also showed similar results. Kabdal *et al.*, (2018) reported that the effective control of weeds in rice could be achieved with pre-emergence herbicide use of pretilachlor, pinoxulam and

pyrazosulfuron. Under transplanted rice in sodic soil, pre emergence application of bensulfuron methyl + pretilachlor at 60 + 600 g a.i. ha⁻¹ on 3 DAT fb hand weeding on 40 DAT resulted in increased yield attributes and nutrient uptake by rice. In cassava, it has been reported that weed control by hoe weeding and earthing up alone may increase the cost of production because of higher labour requirement. However, it was better to practice application of pre emergent herbicides like pendimethalin along with hoeing and earthing up at 60 DAP for effective weed control and reduction in cost of cultivation (Reshma *et al.*, 2016). So, better integration of chemical control along with other farming management practices may provide further improvement in weed management in cassava field.

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