Effect of Variety and Weed Control Methods on Weed Infestation on Cucumber (*Cucumis sativus L*) in Sudan Savannah of Nigeria

ALIYU D[1], M.A MUHAMMAN[2], A. T. AHMAD[3], I. B. MUHAMMED[4], M. S. GARKO[5]
[1,2] *Department of Agronomy Federal University of Kashere, Gombe State*
[3] *Department of Biological Science, Federal University of Kashere, Gombe State*
[4] *Department of Agronomy Bayero University, Kano.*
[5] *Department of Agronomy Kano University of Science and Technology, Wudil*

Abstract*-- Variety and weed management are methods are two paramount considerations in crop production. These two are major consideration in cucumber production in the study area. Thus, Field trials were conducted in 2014 rainy season in Teaching and Research Farm, Faculty of Agriculture, Bayero University Kano (11058'N, 8026'E and 475m above sea level) and Kano Institute of Horticulture Bagaud Kano (Latitude 11033'N and Longitude 8023'E) to evaluate the effect of variety and weed control method on weed growth and yield of cucumber (Cucumis sativa L.) Treatments consisted two cucumber varieties (Ashley and Marketmore), and twelve (12) weed control methods (Pendimethalin at 1.5 kg a.i. ha-1, Pendimethalin at 1.0 a.i. kg ha-1, Pendimethalin at 1.0 kg a.i. ha-1 followed by Fluazifop-P-butyl at 1.0 kg a.i. ha-1, Pendimethalin at 1.5 kg a.i. ha-1 followed ha-1 by Fluazifop-P-butyl at1.5 kg a.i ha-1, Pendimethalin at 1.5 kg a.i. ha-1 followed by supplementary hoe weeding (SHW), Pendimethalin at 1.0 kg a.i ha-1 followed by SHW, Fluazifop p-butyl at 1.0 kg a.i. ha-1, Fluazifop p-butyl at 1.5 kg a.i. ha-1, hoe weeding at two weeks after sowing (2WAS) followed by Fluazifop p-butyl at 1.0 kg a.i. ha-1, hoe weeding at 2WAS followed by Fluazifop p-butyl at 1.5 kg a.i. ha-1, Weedy Check and two hoe weeding at 2 and 4WAS). The experiment was laid out in a split plot design with varieties assigned to the main plot and weed control methods to the sub-plots. Data were collected on weed dry weight, weed cover score and weed control efficiency. Data generated were subjected to analysis of variance. The result revealed that cucumber Ashley variety recorded higher weed control efficiency and low weed dry weight than Marketmore at both locations. Furthermore, Pre-emergence Application of Pendimethalin at 1.0 kg a.i. ha-1 followed by Fluazifop at 1.0 kg a.i. ha-1 and Weed free check recorded significantly superior weed control efficiency and also had lower weed dry weight. Thus Ashley variety and application of Pendimethalin at 1.0 a.i. kg ha-1, Pendimethalin at 1.0 kg a.i. ha-1 followed by Fluazifop-P-butyl at 1.0 kg a.i. ha-1 can be use in cucumber production in this area and similar environment.

Indexed Terms: Cucumber variety, Weed control method

I. INTRODUCTION

Cucumber (*Cucumis sativus* L.) belongs to the family of Cucurbitaceae. It is an important vegetable that is cultivated globally. It has creeping vine that bears large leaves, which form canopy above the cylindrical fruits. It is cultivated in almost all the agro-ecological zones of Nigeria ranging from coastal to savanna zones. The savanna zone of Nigeria has the greatest potential for its production due to moderate rainfall. However, research has proved that it can grow in some southern parts of Nigeria that had moderate rainfall (Enujeke E.C. 2013). The importance of cucumber to mankind can be categorized into three namely: food, medicine and industry. Like food, it is either eaten raw or prepared in various forms especially as components of the vegetable salad. In medicine, it is used to fight against cancers (breast-ovarian, uterine and prostate); treatments for diabetics, skin irritations; rehydrate the body and regain one's self from dryness [Omeh D. 2017, Shetty and Wehner T.C. 2002].

Its benefits concerning other health and medical conditions are widely documented [Edom S. 2017, Holmmes G. J 2000 and Olurun-Ni S. 2017] noted that it is important in cosmetic industry for the manufacture of soaps, lotions, shampoos and fragrant. (Cucumber Wikipedia 2017] The necessity of vegetables in the daily diet made it paramount to include more vegetables in the list of available vegetables. Cucumber (*Cucumis sativa* L.) is fast becoming popular in households, both in the northern and southern part of Nigeria (Ogbodo *et al*. 2010).

Despite the importance of this vegetable, weed competition constitute a major constraint to its production. Weed competition in cucumber is a problem due to lack of appropriate weed control method in this vine vegetable. For successful cucumber production best variety and weed control method which are constraint to productive need to be determined. Thus this research was carried out to evaluate the effect of weed control methods and variety on cucumber production in Sudan savannah ecological zone of Nigeria.

Herbicide use is one of the developments which was introduced later to control weeds in crop production. It is more adapted to large scale production and labour saving (Anon, 1994). Other factors that have made chemical weed control more popular than manual weeding include reduction of drudgery in chemical weed control; it protects crops from the adverse effects of early weed competition which can avert economic losses in cucumber that needs early weed control. The minimum weed-free period required in cucurbit crops such as cucumber, squash and others have been estimated to be between the first 3 to 4 weeks after planting(Gesimba and Langat, 2005) (Weaver S.E. 1984).

II. MATERIALS AND METHODS

Field Experiments was conducted at the Teaching and Research Farm Faculty of Agriculture, Bayero University, Kano (BUK). (Latitude $11^0$58'N and Longitude $8^0$25'E) and Research farm of Institute of Horticulture Bagauda, Kano (Latitude $11^0$33'N and Longitude $8^0$23'E). The experiments were carried out during 2014 rainy season to determine the effect of weed control method on the performance of two cucumber varieties (Ashley and Marketmore), and Cucumber (*Cucumis sativa* L.) in Sudan Savannah ecological zone of Nigeria. Treatments consisted of twelve weed control method (Pendimethalin at 1.5 kg ha^{-1}a.i., Pendimethalin at 1.0 kg ha^{-1} s.i., Pendimethalin at 1.0 kg ha^{-1} a.i followed by Fluazifop-P-butyl at 1.0 kg a.i., Pendimethalin at 1.5 kg ha^{-1} a.i. followed ha^{-1} by Fluazifop-P-butyl at1.5 kg ha^{-1} a.i , Pendimethalin at 1.5 kg ha^{-1} a.i. followed by supplementary hoe weeding (SHW), Pendimethalin at 1.0 kg ha^{-1} a.i followed by SHW, Fluazifop p-butyl at 1.0 kg ha^{-1} a.i., Fluazifop p-butyl at 1.5 kg ha^{-1} a.i., hoe weeding at two weeks after sowing (WAS) followed by Fluazifop p-butyl at 1.0 kg ha^{-1}, hoe weeding at 2WAS followed by Fluazifop p-butyl at 1.5 kg ha^{-1} a.i , Weedy Check and two hoe weeding at 2 and 4WAS), Two Cucumber varieties (Cucumber Ashley and Cucumber Market more). The experiment was laid out in a split plot design with cucumber varieties assigned to main plot and the weed control method to sub plot. They were then replicated three times. The total gross plot of 13.5m^2 and the net plot of 6m^2 were created. Alley ways of 0.5m was left between plots and replication. Cucumber seed was sown at inter and intra row spacing of 1m. Herbicide was applied as per treatment basis using knapsack sprayer fitted with green deflector nozzles at a pressure of 2.1kg/m^2using sprayer volume of 15liter ha^{-1}. Hand hoe weeding was done as per treatment basis while weedy check plot was not weeded throughout the experiment. Fertilizer at the rate of 80 kg N ha^{-1}, 40 kg P ha^{-1}, and 40 kg K ha^{-1}, was applied at 21 days after sowing by side placement method. Insect pest was controlled at two weeks interval using Cypermethrine 10% EC at the rate of 0.05kg ha^{-1}. Data were taken on five randomly selected and tagged plants on weed dry weight, weed cover score and weed control efficiency. The weed dry matter was determined at harvest by harvesting weed biomass from 1m^2 quadrat in each experimental plot. The weeds were later oven-dried at constant weight of 60-70%. The dry weight of weeds was expressed in grams per m^2. The weed cover score was determined at harvest using a scale of 1 to 9, where 1 is complete absence of weeds and 9 is complete coverage of the plot by weeds Weed control efficiency was calculated on dry weight basis using the formula given by Mani et al (1976). Data generated were subjected to analysis of variance appropriate for split plot design using SAS system for window (SAS V8, 2000) Means showing significance F-test were separated using Duncan Multiple Range Test.

III. RESULT

Effect of variety and weed control method on weed control efficiency at 4 and 6WAS is presented in Table 1. The result indicated that Varieties significantly affects weed control efficiency in both locations, Ashley recorded the highest weed control efficiency at both locations. The highest weed control efficiency

was recorded from weed free check which was statistically similar with application of Pendimethalin 1.0 kg a.i./ha followed by Fluazifop 1.0 kg a.i./ha and Pendimethalin 1.0 kg a.i./ha followed by supplementary hoe weeding. However, weedy check significantly recorded the lowest weed control efficiency and was statistically similar with Fluazifop 1.5 kg a.i./ha. There was no interaction between variety and weed control method.

The effect of variety and weed control method on weed dry weight is presented in Table 1: Cucumber varieties were not significantly different in respect to weed dry weight, at both locations. At both location weedy check significantly recorded the highest weed dry weight and was statistically similar to the application of fluazifop at 1.5 kg a.i./ha. Application of Pendimethalin 1.0 kg a.i./ha followed by Fluazifop 1.0 kg a.i./ha significantly recorded the lowest weed dry weight and were statistically similar with some other weed control methods. (Table 1) Variety with weed control has no interaction at both locations.

The effect of variety and weed control method on weed cover scores was presented in Table 2. Variety significantly affects weed cover score; Ashely recorded the lowest weed cover score, at both locations. Weed control methods had significant effect on weed cover score; Weedy check recorded the higher weed cover. The lower weed cover score was recorded from the weed free check at two locations.

IV. DISCUSSION

Weed dry weight was significantly influenced by weed control method. Pre-emergence application of pendimethalin at 1.0 kg combined with fluazifop 1.0kg ai/ ha and weed free check proved superior to rest of the treatment. This may be due to lower weed population recorded under these treatments and may be attributed to the effective weed control at early stage by herbicide application and later stage through hand weeding. The finding could be collaborated with those of Kalhapure et al (2013) in his work on weed management in onion reported that lower weed density observed with the treatment of three hand weeding at 20, 40 and 60 DAT. and was on par with the treatment of pendimethalin @ 1.0 kg/ha (PPI) + oxyfluorfen @ 0.250 kg/ha (PoE) + one hand weeding at 40 DAT.

The highest weed control efficiency was recorded from weed free check which was statistically similar with application of Pendimethalin 1.0 kg a.i./ha followed by Fluazifop 1.0 kg a.i./ha and Pendimethalin 1.0 kg a.i./ha followed by supplementary hoe weeding. However, weedy check significantly recorded the lowest weed control efficiency and was statistically similar with Fluazifop 1.5 kg a.i./ha. This was also in consonant with results

obtained by Kalhapure et al (2013) who find out that Treatment of three hand weeding at 20, 40 and 60 DAT showed highest weed control efficiency, followed by the treatment of pendimethalin @ 1.0 kg/ha (PPI) + oxyfluorfen @ 0.250 kg/ha (PoE) + one hand weeding at 20 DAT. In case of integrated weed management in onion combination of chemical and cultural weed control is found to be effective. PPI of pendimethalin causes reduction in germination of total weed population during initial period of crop growth, further the PoE application of oxyfluorfen might have control to the first flush of broad leaf weeds in onion, when applied at 25 DAT. This was combined with hand weeding at 40 DAT, be efficient for the control of remaining grassy weeds and second flush of broad leaf weeds.

V. CONCLUSION

From the result of this study variety and weed control methods has a significant influence on the performance of cucumber as well as weeds. Thus, Ashley variety and application of Pendimenthalin at 1.0 kg ha^{-1} followed by Fluazifop at 1.0 kg ha^{-1} should be use for cucumber production in the study area and similar environment.

Table 1: Effect of Variety and Weed Control Methods on Weed Control Efficiency and Weed Dry Weight in Cucumber (Cucumis sativa L.) at BUK and Bagauda in 2014 Rainy Season.

Treatment	Weed Control Efficiency (%)		Weed Dry Weight (kg)	
	BUK	Bagauda	BUK	Bagauda
Variety (V)				
Ashley	48.03a	48.27a	4641.62	2217.40
Marketmore	45.96b	46.72b	2546.44	2701.39
SE ±	0.720	0.860	49.08	64.74
Weed Control Method (WCM)				
Pendementhelin 1.5 kg a.iha-^{1}	55.21bc	53.45bc	2023.10fg	2488.00de
Pendementhelin 1.0 kg a.i ha-^{1}	34.22f	34.72de	3236.30c	3488.80b
Pendementhelin1.0 kg + Fluazifop 1.0 kg ha-^{1}	52.72cd	59.16ab	1873.70g	1879.30f
Pendementhelin1.5 kg + Fluazifop 1.5 kg ha-^{1}	58.91ab	56.54ab	2535.30de	2409.00d
Pendementhelin 1.5 kg a.i ha-^{1} +SHW	60.44ab	61.41a	2111.10f	3180.20ef
Pendementhelin 1.0 kg a.i ha-^{1} +SHW	48.44d	48.35c	1942.00g	2865.50cd
Fluazifop 1.0 kg a.i ha-^{1}	44.17e	41.35d	3400.20ab	3473.30ab
Fluazifop 1.5kg a.i ha-^{1}	30.74fg	31.27ef	2869.20cd	2477.60de
HW + Fluazifop1.0 kg ha-^{1}	53.02cd	53.45bc	2311.50ef	3183.60bc
HW +Fluazifop 1.5 kg ha-^{1}	40.25e	40.26d	2938.30c	
Weedy check	26.00g	26.85f	3638.70a	4073.80a
Weed free check	62.28a	63.10a	225o.40ef	2050ef
SE ±	11.450	11.680	555.13	633.35
Interaction				
V * WCM	NS	NS	NS	NS

Means with same letter(s) in the same column are not significantly different (P> 0.05) using (DMRT) NS = Not significant

Table 2: Effect of Variety and Weed Control Method on Weed Covers Score in Cucumber (Cucumis sativa L.) at BUK and Bagauda in 2014 Rainy Season.

Treatments	Weed Cover Score	
	BUK	Bagauda
Variety (V)		
Ashley	4.76b	4.65b
Marketmore	5.42a	5.22a
SE ±	0.070	0.120
Weed Control Method (WCM)		
Pendementhelin 1.5 kg a.iha-^{1}	4.83e	5.00d
Pendementhelin 1.0 kg a.i ha-^{1}	6.83b	6.67b
Pendementhelin1.0 kg + Fluazifop 1.0 kg ha-^{1}	4.00f	3.33d
Pendementhelin1.5 kg + Fluazifop 1.5 kg ha-^{1}	4.17f	5.00d
Pendementhelin 1.5 kg a.i ha-^{1} +SHW	3.00h	2.83j
Pendementhelin 1.0 kg a.i ha-^{1} +SHW	4.83e	4.50ef
Fluazifop 1.0 kg a.i ha-^{1}	6.00c	5.33c
Fluazifop 1.5kg a.i ha-^{1}	5.33d	4.33fg
HW + Fluazifop1.0 kg ha-^{1}	4.83e	4.67e
HW +Fluazifop 1.5 kg ha-^{1}	4.50e	4.17g

Weedy check	9.00a	9.00a
Weed free check	3.67g	3.83h
SE ±	0.380	0.370
Interaction		
V*WCM	NS	NS

Means with same letter(s) in the same column are not significantly different (P > 0.05) using (DMRT) NS = Not significantly different.

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