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

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Abstract-- Variety and weed management are methods are two paramount considerations in crop production. These two are major considerations 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 kg a.i. 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°58’N and Longitude 8°25’E) and Research farm of Institute of Horticulture Bagauda, Kano (Latitude 11°33’N and Longitude 8°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\(^{2}\)using 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 at 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; Ashley 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 Pendimethalin 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.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Weed Control Efficiency (%)</th>
<th>Weed Dry Weight (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BUK</td>
<td>Bagauda</td>
</tr>
<tr>
<td>Variety (V)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ashley</td>
<td>48.03a</td>
<td>48.27a</td>
</tr>
<tr>
<td>Marketmore</td>
<td>45.96b</td>
<td>46.72b</td>
</tr>
<tr>
<td>SE ±</td>
<td>0.720</td>
<td>0.860</td>
</tr>
<tr>
<td>Weed Control Method (WCM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pendementhelin 1.5 kg a.i ha⁻¹</td>
<td>55.21bc</td>
<td>53.45bc</td>
</tr>
<tr>
<td>Pendementhelin 1.0 kg a.i ha⁻¹</td>
<td>34.22f</td>
<td>34.72de</td>
</tr>
<tr>
<td>Pendementhelin1.0 kg + Fluazifop 1.0 kg ha⁻¹</td>
<td>52.72cd</td>
<td>59.16ab</td>
</tr>
<tr>
<td>Pendementhelin1.5 kg + Fluazifop 1.5 kg ha⁻¹</td>
<td>58.91ab</td>
<td>56.54ab</td>
</tr>
<tr>
<td>Pendementhelin 1.5 kg a.i ha⁻¹ +SHW</td>
<td>60.44ab</td>
<td>61.41a</td>
</tr>
<tr>
<td>Pendementhelin 1.0 kg a.i ha⁻¹ +SHW</td>
<td>48.44d</td>
<td>48.35c</td>
</tr>
<tr>
<td>Fluazifop 1.0 kg a.i ha⁻¹</td>
<td>44.17e</td>
<td>41.35d</td>
</tr>
<tr>
<td>Fluazifop 1.5 kg a.i ha⁻¹</td>
<td>30.74fg</td>
<td>31.27ef</td>
</tr>
<tr>
<td>HW + Fluazifop 1.0 kg ha⁻¹</td>
<td>53.02cd</td>
<td>53.45bc</td>
</tr>
<tr>
<td>HW + Fluazifop 1.5 kg ha⁻¹</td>
<td>40.25e</td>
<td>40.26d</td>
</tr>
<tr>
<td>Seedy check</td>
<td>62.28a</td>
<td>63.10a</td>
</tr>
<tr>
<td>SE ±</td>
<td>11.450</td>
<td>11.680</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Weed Cover Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BUK</td>
</tr>
<tr>
<td>Variety (V)</td>
<td></td>
</tr>
<tr>
<td>Ashley</td>
<td>4.76b</td>
</tr>
<tr>
<td>Marketmore</td>
<td>5.42a</td>
</tr>
<tr>
<td>SE ±</td>
<td>0.070</td>
</tr>
<tr>
<td>Weed Control Method (WCM)</td>
<td></td>
</tr>
<tr>
<td>Pendementhelin 1.5 kg a.i ha⁻¹</td>
<td>4.83e</td>
</tr>
<tr>
<td>Pendementhelin 1.0 kg a.i ha⁻¹</td>
<td>6.83b</td>
</tr>
<tr>
<td>Pendementhelin1.0 kg + Fluazifop 1.0 kg ha⁻¹</td>
<td>4.00f</td>
</tr>
<tr>
<td>Pendementhelin1.5 kg + Fluazifop 1.5 kg ha⁻¹</td>
<td>4.17f</td>
</tr>
<tr>
<td>Pendementhelin 1.5 kg a.i ha⁻¹ +SHW</td>
<td>3.00h</td>
</tr>
<tr>
<td>Pendementhelin 1.0 kg a.i ha⁻¹ +SHW</td>
<td>4.83e</td>
</tr>
<tr>
<td>Fluazifop 1.0 kg a.i ha⁻¹</td>
<td>6.00c</td>
</tr>
<tr>
<td>Fluazifop 1.5 kg a.i ha⁻¹</td>
<td>5.33d</td>
</tr>
<tr>
<td>HW + Fluazifop 1.0 kg ha⁻¹</td>
<td>4.83e</td>
</tr>
<tr>
<td>HW + Fluazifop 1.5 kg ha⁻¹</td>
<td>4.50e</td>
</tr>
<tr>
<td>Interaction</td>
<td>V*WCM</td>
</tr>
<tr>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td>Weedy check</td>
<td>9.00a</td>
</tr>
<tr>
<td>Weed free check</td>
<td>3.67g</td>
</tr>
<tr>
<td>SE ±</td>
<td>0.380</td>
</tr>
</tbody>
</table>

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

REFERENCES


