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Evaluation of Suckericides and Manual and Without de-suckering on the Yield of FCV Tobacco Varieties

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Abstract

To compare suckericides with manual and without removal sucker on yield and quality tobacco under growing condition of Billatie leaf production farms, south region of Ethiopia, an experiment was conducted using randomized complete block Design (RCBD), during 2017-2018 in dry and wet seasons. Treatments consisted of two suckericides, Butarlin @ 5ml plant-1 and fatty alcohol @ 9ml plant-1 with manual and without desuckering. High number of 7.08 and 8.00 suckers plant -1 and fresh weight of suckers 1.83 and 2.77 kg plant -1and were obtained for the plot transplanted K-110 and PVH-2299 respectively for treatment without desuckering. While, lower number of 5.50 suckers plant -1 for both varieties and fresh weight of suckers 0.50 and 0.93 kg plant-1 were obtained in plots treated with butralin 240ml suckericide for K-110 and PVH-2299 respectively. This suggests that Butarline Suckericide was effective in controlling suckers in comparison with fatty alcohol, manual and without desuckering.

Keywords: leaf yield, suckericide, tobacco

1. INTRODUCTION

Suckering (removing subsequent suckers) are very important operations which have significant effect on yield and grade composition of tobacco (Nicotiana tabacum L.) (Anonymous,1997). Once plants have been topped the suckers that develop as a result of removal of apical dominance have to be removed (suckering) by hand or a chemical sucker control agent (suckercide), Removal of the terminal bud or inflorescence of the tobacco plant, commonly known as topping, is usually accomplished by manually removing the top of each tobacco plant in an entire field, which is labor intensive and costly. Removal of the terminal bud or inflorescence prevents reproductive development (i.e. seed head) and results in energy transfer to increased leaf size, weight, nicotine content, and other chemical constituents (Tso, 1990).

Controlling sucker growth is positively correlated with yield, where greater sucker control is associated with increasing yield and improving quality of the product of tobacco (Collins and Hawks,1993). This suckers are developed from the leaf axil just after topping of tobacco plants. These unwanted suckers compete for food, light, moisture and space. In fuel cured tobacco, due to its high requirements of nitrogen fertilizers, the desuckering problem is more acute as compared to other types of tobacco. Suckers not only deprive the plants from their essential nutrients but also harbor insect pests and disease organisms. These suckers should be removed to reap maximum benefit by hand or chemical desuckering before they become large enough to retard the development of the leaves. While, these suckers can be removed by hand but it is laborious task and consumes a lot of labor and time.

Chemical control sucker growth can be accomplished with the use of growth regulators or suckericides known as Contacts (fatty alcohols), which kill small suckers by touching and burning ;" Contact-local systemic (Prime plus, flora or butralin), which must touch the suckers to be effective, although they also retard sucker growth by inhibiting cell division; systemic maleic hydrazide [MH]), which moves from sprayed leaves to small sucker buds and retards their growth by inhibiting cell division , and mixtures of two of these chemical types (Khajehpour,2006; Rao et al., 1993).

Very a few reports have investigated the effect of chemicals suckericide on sucker growth and quality of tobacco Liu et al., (1993); Patel et al., 1996; Massymowicz and Palmer (1997) found that tobacco treated application of suckericide within health limit concentrations to suppress the growth of suckers are very important to labour cost reduced, increase green leaf yield and quality. While, hand de suckering is time consuming, laborious and

more expensive process. Couson, (1959) reported as many as 119 man hours per acre were required to remove suckers by hand. Maleic hydrazide, a systemic type chemical, has made it possible to partially control the growth of these suckers chemically. Marshall et al., (1964) reported that when plants were hand suckered the highest price per hundred\weight was obtained when plants were topped in the early flower stage, but when suckers \were controlled chemically with maleic hydrazide the highest price was obtained when plants were topped at the full flower stage.

In National Tobacco Enterprises (Ethiopia) SC, tobacco out growers and enterprise farm to get plant free from suckers during crop life mostly 4-5 times de-suckering is required. Manually removal of suckers from tobacco plant requiring considerable time and a lot of labour effort. Therefore, in Ethiopia most out- growers don't remove suckers their field at the right time because laborious job and consumes a lot of labour and time. Rather, de-suckering is done at when labour is available sucker control in National Tobacco Enterprise (Ethiopia) has not changed in the last 50 years and hand sucker control is still by far the only widely practiced sucker control method.

Keeping in view the importance of the suckericides' application in tobacco the experiment was initiated at Billatie tobacco leaf development farm was carried out to compare suckericides with manual and without removal sucker on yield and **quality** tobacco under growing condition of Billatie tobacco farms, south region of Ethiopia

2. Materials and Methods

Experimental site/ location

The field experiment conducted at Billatie leaf production farms during 2017-2018 in two seasons to compare suckericides with hand and without removal sucker on yield and quality FCV tobacco varieties K-110 and (variety male sterility PVH2299). The experiment was carried out under irrigation on a loam soil texture (25% clay, 40% sand, and 35% silt) with an average pH of 7.09, total carbon 1.05% and nitrogen 0.084% (Landon,1991). Meteorological data shows the long term (2004-2017) mean temperature 23ºc; maximum temperatures were 31.3ºc; minimum temperature 17.2ºc and mean precipitation were 749.78mm.

2.1. Experimental design and procedure

2.1.1. Experimental Design

The experiment was conducted using Randomized Complete Block (RCB) design with three replications. The row to row distance was 1.10 m and plant to plant distance 0.55m.

2.1.2. Experimental Operation

Before transplant, land was ploughed using tractor, Ridges were made and transplant was done on ridges according to the mentioned recommended spacing. Plants were topped at 22 leaves/plant and after topping operation time single spraying suckericides: - T1) local systemic butralin, trade name Tobago ® 240ml mix with 16 liter water final volume single application of 5 ml for each plant just after topping to suppress the emergence of suckers, T2) liquid de-suckering a fatty alcohol contact, trade name seeten, at topping, followed 9 ml per plant, one litter fatty alcohol mix with 20liter water(1:20) mix thoroughly to uniform mixture, T3) manually de-suckering axillary suckers as well as ground suckers were removed by hand from the axil/base of the leave the operation commence after 7 days of topping operation and continued for 3-4 times , and T4) control (no sucker control)

2.1.3. Field management

Irrigation was applied immediately after and before transplant. After transplant flooding irrigation was applied 7-8 times when need**. Urea source of Nitrogen and NPS were applied with rate of 100 kg/ha. After 8-10 days' transplantation full dose of NPS and 25% urea were applied to the two sides of plants. The rest 75% urea applied after 1st cultivation or at 4 weeks after transplantation.**

3. Data recording and analysis

Measured traits in this study were consisting of fresh leaf yield per plant, number of sucker plant-1, fresh weight of sucker's plant- 1, **cost effective and quality analysis.** The data was analyzed using SAS software. The Duncan's multiple range tests (DMRT) was use compare the means at 5% level of significance (SAS,2003).

4. Results and Discussion

4.1. Number of sucker's plant-1

Number of suckers' plant -1 was significantly affected by different treatments of sucker control. Mean values of the data in table 1 indicated that maximum number of suckers plant -1 (7.0 and 8.0 suckers plant -1) were produced by plots where for not sucker removed for K-110 and PVH-2299 varieties respectively which were statistically significantly different from plots treated with Butraline (5.50 suckers plant -1) recorded both varieties followed by plots treated with fatty alcohol and hand removal sucker (6.83 suckers plant -1) for both varieties . Our result in agreement with Wikox et al., (1977) reported butralin is used for sucker control in various areas of the world and because it has shown promise in experimental trials in the United states and various areas of the world

4.2. Green weight of sucker plant-1

The effect of sucker controller trait on green weight of sucker plant-1 had significant differences at 5% probability level for K-110 and PVH2299 (Table-1). The highest amount of green weight of sucker was recorded from treatment control plot and hand removal for k-110 and PVH2299 tobacco varieties. The lowest amount of green weight of sucker was recorded from treatment of treated by Butralin recorded (0.50 and 0.17 sucker's kg per plant) for K-110 and PVH2299 varieties respectively. This result also show that Butralin sucker was best controlled by using this concentration of suckericide and had thus provided the plants with more nutrients. Our result in line with Yelverton et al., (1993) on his experiment prone that sucker control by Butralin, as measured by the number of suckers/plant and green weight of suckers/plant, was comparable or better than fatty alcohol and potassium salt of maleic hydrazide.

4.3. Green weight of leaves yield (kg pl-1)

No differences in green leaves weight were obtained with comparison of mean between traits. On the other hand, the highest green leaf yield was obtained from Butralin for K-110 (1.52 kg pl-1), and tobacco variety PVH2299 (2.45 kg pl-1) respectively. While hand removal and control plot produced the lowest green weight of leaves plant-1 (1.45 and 2.41), (1.19 and 2.16 kg/plant) for variety K-110 and PVH2299 respectively (Table-1). These results are in accordance with the results obtained by Yrelverton et al, (1993); Fail et al., (1979) stated that butralin fresh leaf weight, leaf are and leaf are index were not significant among traits. They reason this

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because yield differences were independent of suckericide treatment yield differences were most likely random or were caused by some factors independent treatments from in this study.

Table 1. Impact of treatments on some agronomic characteristics of FCV tobacco (K- 110 and PVH-2299).

Treatment	Count (suckers/plant)		Green weight of suckers plant-1 (kg)		Fresh eight of leaves plant $^{-1}$ (kg)	
	K-110	**PVH-2299**	**K-110**	**PVH-2299**	**K-110**	**PVH-2299**
Control	7.00a	8.00	1.83	2.77a	1.01	2.07a
Butarlin	5.50b	5.50b	0.50 b	0.17c	1.52 a	2.45a
Fatty alcohol	6.83a b	6.83ab	0.83 ab	0.93b	1.45 a	2.23a
Manual	6.83a	6.83ab	1.00	1.23c	1.21	2.16a
Mean	6.54	6.71	1.04	1.28	1.29	2.23a
LSD at	2.85	2.74	0.72	0.42	0.36	1.87

Mean of the same category followed by different letters significantly different from one another at $p \leq 0.05$ using LSD test

5. Conclusion

According to this finding, the best suckers controlling method for obtained maximum sucker control from the plots treated with local systemic comparison with contact suckericide, manual and without desuckering. Plots treated single applied Butralin suckericide gave good control of number of sucker plant-^{1} and fresh weight of suckers' plant -^{1}. Additional experiments should address Butralin frequency of applications, mixing with fatty alcohol or alternatively use at Billatie tobacco farm.

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