INNSPUB

International Journal of Biosciences | IJB |
ISSN: 2220-6655 (Print), 2222-5234 (Online)
http://www.innspub.net
Vol. 6, No. 2, p. 134-139, 2015

RESEARCH PAPER OPEN ACCESS

Effect of different suckrecides on the yield of tobacco (*Nicotiana tabacum* L.)

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Key words: Suckrecides, pendimethalin, leaf area, tamex, tobacco.

http://dx.doi.org/10.12692/ijb/6.2.134-139 Article published on January 18, 2015

Abstract

The experiment was conducted at tobacco research station Khan Garhi, Mardan during summer 2009-2010. The experiment was design in completely randomized block design (CRBD) with three replicates for different suckrecides i.e. Myleng 2, Stomp 330 E, Tamex and Pendimethalin 33 EC along with topping or desuckering. Correct study revealed that significant differences prevailed among different chemical suckrecides for the traits studied. Maximum values for leaf area (994.5), fresh weight of leaves/plot (47.22 gm), cured weight of leaves/plot (7.127), and leaf yield (3195 kg/ha) maximum values were obtained in plots treated with pendimethalin 33EC, whereas, minimum mean values for number of suckers/plant (1.4), green weight of suckers/plant (60.11 gm) and dry weight of suckers/plant (18.43 gm) were also obtained for the plots treated with Pendimethalin 33EC. Other suckrecides were also effective in increasing leaf area and leaf weight. Maximum mean values for number of suckers/plant (15), fresh weight of suckers/plant (394.5gm) and dry weight of suckers/plant (76.38 gm) were obtained for control plants. Whereas minimum values for leaf area (792.5cm^2), fresh weight of leaves/plot (40.69gm), cured weight of leaves/plot (5.76 gm), and leaf yield (2585 kg/ha) was obtained for the plots of control treatment. It was observed that chemical suckrecides gave maximum values for yield (leaves) and yield associated traits by controlling suckers in comparison with manual desuckering. Suckerecides were found effective in increasing yield and controlling suckers in comparison with manual desuckering and Pendimethalin 33 EC gave maximum leaf area and leaf yield.

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Introduction

Tobacco belongs to the family Solanaceae and genus *Nicotiana*. Two species namely *Nicotiana tabacum* and *Nicotiana rustica* are widely grown all over the world. The former is mainly utilized for the manufacturing of cigarettes, cigars and bidi whereas the latter one is used for making snuff, smoking in hooka and also for chewing. It is an annual self pollinated, long day plant with tap root system and large broadly ovate leaves covered with sticky hairs. The inflorescence of tobacco is terminal raceme. Large quantities of seed are produced which are extremely small. Both quantity of tobacco leaves produced and quality of cured leaves are important for greater returns to the grower from the tobacco crop and for making good quality cigarettes by the manufacturer (Brandner *et al.* 2003). Tobacco (*Nicotiana tabacum*) is one of the most important cash crops with great potential for foreign exchange earnings and other economics benefits. Tobacco industry employs over 1.0 million people, generates Rs.27.5 billions as contribution to GDP (gross domestic product) and adds Rs.15.17 billions as tax revenue to the economy of Pakistan. During 2008-09, the area under cultivation was 49.7 thousand hectare with an average production and yield of 104.9 thousand tones and 2111 kg/ha respectively (Minfal, 2004). Lee 2008 described that tobacco control yields are clear dividends for health and wealth. Smith *et al* 2009 reported Tobacco industry attempts to undermine Article 5.3 and the good governance. The package of production technology for tobacco crop involves many operations including topping and desuckering. Immediately after topping the buds in axils of leaves, which otherwise remain dormant due to apical dominance, becomes active and put forth shoots known as “suckers”. Like flowers the suckers are also becomes a drains on the nutrients of the plants and thus suckers are also removed. The removal of suckers is called “desuckering”. The tobacco plant has the capacity of producing 3 suckers in each leaf axial, which usually require 4-5 times desuckering for getting sucker free plant. Unfortunately, suckers develop in tobacco plants from the shoot. These unwanted suckers grow with tobacco plants after topping and compete for food, light, moisture and space. These suckers are very healthy and usually grow at faster rate than tobacco leaves. These suckers thus not only rob the plants of their essential food elements but also harbor insects, pests and disease organisms. It has been experimentally proved that topping and desuckering give high yield per hectare and also improves the quality of tobacco leaves by increasing the nicotine contents (Shah, 1998).

Removal of suckers from tobacco is a laborious job and consumes a lot of labor and time. Due to the above reasons it was thought essential to find out the proper suckericide and its concentration for suckers control, so that tobacco crop can be raised without suckers and which would be economical. Bhat *et al.* 1994 reported chemical control of suckers increased cured leaf yield by 3-23% compared with hand desuckering. Patel *et al.* 1996 concluded that pendimethalin, alone or combined with decanol gave the best sucker control and highest cured leaf yield. The present work is also conducted to investigate the effect of different suckerecides on FCV tobacco. For this field work the tobacco verity K-399 was selected. The suckerecides used for this field work there are as under.

1. Pendimethalin 33%EC [N-(1-ethylpropyl)-3,4-dimethyl-2,6-dinitrobenzenamine] is a selective herbicide used to control most annual grasses and certain broadleaf weeds in field, corn, potatoes, rice, cotton, soybeans, tobacco, peanuts and sunflowers.

2. The primary mode of action of STOMP (Dinitroaniline) is to stop plant cells dividing and elongating in susceptible species. STOMP alone, and in combination with other herbicides, is registered for use in over 60 countries in more than 70 crops. Weed control in cereals, canola, rice, maize, sunflower, cotton, sugarcane, vegetables, plantation crops, and other agronomic and horticultural crops has been outstanding.

3. Tamex (Dinitroaniline) is a selective herbicide,

absorbed by germinating seedlings, with slow translocation acropetally. It also acts as a growth regulator, suppressing the growth of shoots, branches, and suckers, its use to control suckers on tobacco plant.

Materials and methods

Field experiments were conducted at Tobacco Research Station, Khan Garhi, Mardan (Khyber PakhtunKhawa) in order to study the effect of different suckericides on the yield of tobacco variety K-399. Experiments comprised of five treatments, Myleng 2, Stomp 330E, Tamex, Pendymethalin 33 EC and manual topping/desuckering were examined in this experiment. Experiment was carried out in complete randomized block design (CRBD) with three replications. Each subplot measured 6×3.6 m^2 with four rows, 6 m^2 long, having 10 plants in each row. The row-to-row distance was 90 cm, while plant-to-plant distance was 60 cm. Nursery was prepared during the month of December and transplantation was carried out during the last week of March. Before transplantation, land was ploughed using cultivator and then worked with rotavator for breaking of clods. Ridges were made and transplantation was done on ridges on the mentioned recommended spacing. Plants were irrigated immediately after transplantation.

Suckericides were obtained from the local market and applied on 25 June and after establishment of the plants, weeds were removed through hoeing. When plants reached the button stage topping was done in each subplot and then treated with suckericides and manual desuckering. Field was thoroughly prepared, irrigated and weeds were removed according to the standard practices. The data was recorded on Number of suckers/plant, Green weight of suckers/plant, Dry weight of suckers/plant, leaf area, Green weight of leaves/plot, Cured weight of leaves/plot and Leaf yield (kg/ha).

Leaf area was calculated by measuring the length and breadth of 5th, 10th and 15th leaf. The average leaf size was computed from the leaf position by multiplying with a common factor 0.635.

Leaf area= Leaf length × Leaf breadth × 0.635Leaf yield was measured by taking the weight of cured leaf in each treatment after each picking. The total cured leaf yield was calculated by the following formula:

$$\text{Cured leaf weight (kg/ha)} = \frac{\text{Cured leaf weight sub-plot-1} \times 10000\ m^2}{\text{Area harvested (18.2 } m^2)}$$

Results and discussion

We conducted field trials to control suckers in tobacco plants (Mohammad and Hashmi, 1981). After removal of apical meristem, subsequent axillary bud development was inhibited by spraying different suckerecides. Mahadevareddy *et al.* 1986 performed an experiment to determine the effect of different conc. of Acetyl alcohol, Accotab [Pendimethalin], an ILTD mixture and Neem oil apply by different methods on sucker growth in *Nicotiana tabacum*.

Table 1. Effect of suckericides on number of suckers per plant and fresh and dry weight of suckers per plant of Tobacco variety K—399.

S. No.	Treatments	No. of suckers/plant	Fresh weight (gm) of suckers/plant	Dry weight (gm) of suckers/plant
1.	Control	15	394.5	76.38
2.	Pendimethalin 33 EC	1	60.11	17.43
3.	Tamex	3	150.5	34.53
4.	Stomp 330 E	2	105.2	25.18
5.	Myleng 2	2	98.47	18.07

Suckericides had significant effect on number of suckers/plant (Table-1). Mean values showed that maximum value of number of suckers/plant (15.00) were obtained in those plots where suckers were

manually controlled while minimum numbers of suckers were recorded in plots sprayed with Pendimethalin 33 EC (1.400). These results suggest that suckericides were more effective than manual desuckering. These results agree with those reported Mahadevareddy *et al.* 1986 concluded the best sucker control and leaf yields were obtained with the use of chemical suckericides.

Weight of suckers/plant indicated highly significant difference at different suckericides as revealed in table 1. Maximum green weight of suckers/plant (394.5 g) was obtained from plots in which desuckering was done manually and minimum green weight of suckers/plant (60.11 g) was obtained from plots treated with Pendimethalin 33 EC The reason could be that in manual desuckering, suckers were vigorous because of maximum utilization of nutrients, while Pendimethalin 33 EC fully suppressed suckers growth. These findings are in close proximity with earlier findings of Bakht *et al.* 2007, who concluded that suckerecides reduced suckers weight/plant as compared with manual desuckering.

Table 2. Leaf area of Tobacco variety K-399 as affected by different suckericides.

S. No.	Treatments	Quantity applied	Leaf area (cm2)
1.	Control	0 mL/liter	792.5
2.	Pendimethalin 33 EC	30ml/litter	994.5
3.	Tamex	30ml/litter	816.5
4.	Stomp 330 E	30ml/litter	922.4
5.	Myleng 2	30ml/litter	985.1

Suckerecides significantly affected dry weight of suckers/plant as shown in table 1. Maximum mean value of dry weight of suckers/plant was recorded in plots with manual desuckering (76.38) while minimum value of dry weight of sucker of suckers/plant (17.43 g) was obtained from the plots treated with Pendimethalin 33 Ec. The reason could be that Pendimethalin 33 EC suppressed suckers growth and hence its weight was low, while in manual desuckering suckers growth was rapid due to full utilization of nutrients. These results are similar to those by Patel *et al.* 1990, concluded that chemical desuckering decreased dry weight of suckers/plant in FCV tobacco.

Table 3. Effect of different 0 suckericides on fresh weight of leaves, weight of cured leaves and yield (leaves) of Tobacco variety K-399.

S. No.	Treatments	Quantity applied	Fresh weight of leaves/plot (gm)	Weight of treated leaves (gm)	Yield (leaves Kg/hac)
1.	Control	0 mL/liter	47.22	6.923	2585
2.	Pendimethalin 33 EC	30ml/litter	42.94	7.127	3195
3.	Tamex	30ml/litter	44.94	6.14	2753
4.	Stomp 330 E	30ml/litter	44.29	6.42	2878
5.	Myleng 2	30ml/litter	46.71	5.767	3104

The effect of different suckerecides on leaf area was highly significant as given in table 2. It showed that maximum value of leaf area was obtained by Pendimethalin 33 Ec (994.5cm^2) while minimum value by manual desuckering (792.5 cm^2). The reason could be full utilization of plant nutrients by the

leaves in chemical desuckering. These finding are in close conformity with the finding of Qahar *et al.* 2006 and Bush and Sims, 1974. They observed the application of suckericides on leaf area of tobacco.

Green weight of leaves/plot showed highly significant difference by the application of different suckericides as reported in Table-3. Maximum mean value (47.22g) was recorded in plots treated with Pendimethalin 33 EC, while minimum mean value (40.69g) for green weight of leaves plot^{-1} were obtained in plots in which desuckering was done manually. The above results were concurrent with the finding of Jan *et al.* 2001, uses of chemical suckericides were effective in increasing leaf weight.
Cured weight of leaves/plot is given in Table-3. Analysis of variance showed highly significant difference by the application of suckericides for cured weight of leaves /plot. Mean table showed that maximum value of cured weight of leaves/plot were obtained by Pendimethalin 33 EC (7.127g) while minimum value by manual desuckering (5.767g). The results obtained are also in close agreement to Bhat *et al.* 1990, suckericides gave greater monetary returns than manual desuckering.

Leaf yield was highly significantly affected by suckers control through different suckericides (Table 3). Mean value of the data indicated that maximum leaf yield of 3195 kg/ ha was produced in those plots which were sprayed with Pendimethalin 33 EC followed by the plots (3104 kg/ ha) sprayed with Myleng 2. It can also be seen that plot in which suckers were controlled manually, produced minimum leaf yield (2585 kg/ ha). The reason may be that optimum dose of Pendimethalin 33 EC increased leaf area and ultimately increased photosynthate formation resulting increase in yield / ha, while in control plot most of photosynthate was utilized by suckers resulting low yield. These results are in agreement with (Bakht *et al.* 2007; Bhat *et al.* 1990; Qahar *et al.* 2006), who stated that chemical desuckering effectively increased yield contributing traits in tobacco.

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