Comparative Performance of Fcv Exotic Hybrids Tobacco Under Agro-Limatic Conditions of Mardan

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Abstract

A filed experiment on comparative performance of FCV exotic hybrid tobacco under agro-climatic condition of Mardan was conducted at the Tobacco Research Station Khan Gharry Mardan during the year of 2014-2015. The experiment was designed in randomized complete block design with three replications and ten (10) hybrids (PVH-2310, PVH-2275, PVH-2233, PVH-2261, CSC-4302, CSC-444, CSC-447, CSC-4703, SPT-G-28 and K-399). The plant to plant distance was 60cm and row to row distance was 90cm. The plot size was 5.4 m^2. The parameters studied were plant Height, leaf area, number of leaves plant^{-1}, green leaves weight plot^{-1}(kg), number of green leaves kg^{-1}, cured leaves kg^{-1}, cured leaf yield (kg ha^{-1}), reducing sugar (%) and nicotine (%). The studied tobacco hybrids exhibited non-significant differences for the number of cured leaves kg^{-1}, nicotine and reducing sugar (%), however for plant height, leaf area, number of leaves plant^{-1}, number of green leaves kg-1, cured weight per plot, green weight plot^{-1}, yield (kg ha^{-1}) were significantly affected.

The highest number of leaves (27), plant height (131cm), green leaves weight plot-1(80kg), cured leaves weight plot^{-1}(12 kg) and yield (4467 kg ha^{-1}) were obtained by PVH-2310. According to the result, highest mean values for leaf area (1280cm^2) was obtained for CSC-4703 and the highest mean value for cured leaves kg^{-1} (146) was obtained for CSC-444 as compared to the other studied tobacco hybrids. Hence it is concluded and suggested from this experiment that the FCV tobacco hybrid PVH-2310 performed better as compared to other hybrids in agro-climatic condition of Mardan.

Keywords: Tobacco; Hybrids; Quality of Tobacco

Introduction

Tobacco belongs to the family Solanaceae under genus Nicotiana. Only two species of this genus (NicotianatobaccumL. and NicotianarusticaL.) are widely cultivated all over the world for tobacco production. Tobacco is one of the few crops entering the world trade entirely on leaf basis and is the most widely grown commercial non-food plant in the world. It is used in the manufacture of cigarettes, cigars, biddies among others [1].

It is an annual crop but in Mexico and tropical countries it is grown as a perennial crop. Before the creation of Pakistan Nicotianatobaccum were grown in the KPK, Punjab, and Sindh for local consumption in hukka, snuff and biddies. The first commercial cultivation of flue cured Virginia (FCV) tobacco in KPK coincides with the creation of Pakistan. Since then the area and production has been increased significantly due to the untiring efforts of growers, tobacco companies and agricultural scientists.

The agro-climatic condition are highly congenial for its cultivation but these congenial condition are found in some areas at KPK specially in Mardan, Swabi, Charsadda, Buner and other parts of KPK and in some areas of Punjab. It is also cultivated in other countries like India, Mexico (America) etc. Total cultivated area in KPK is 325000 hectares that produces 782000 tons of tobacco contributing R.s.10.9 billion [2]. Next to sugarcane and sugar beet, tobacco is the major source of income for farmers in the KPK. Evolution of high yielding tobacco varieties and improvement in leaf quality will fetch increased income to the growers and enhance exports of tobacco and its products. To improve the yield of tobacco, it is necessary to know the important plant characteristics such as plant height,

total number of leaves plant^{-1}, cured leaf yield and total yield of different genotypes used in a particular study [3]. The yield of tobacco can be increased by different ways. The most simple and straight options is "variety" which can increase or decrease yield. Those verities should be cultivated which gives high yield in that area. Our farmers are getting low yield of tobacco as compare to other countries of the world. One of the main reasons is lack of appropriate tobacco varieties which needs to be addressed. It will significantly increase production per unit area Imtiaz, 2005.

Unfortunately, there is no sufficient number of outstanding tobacco varieties and farmers have to rely on two or three standard varieties to fulfill their economic requirements. However, as an alternate, tobacco companies and tobacco board is striving for importing hybrids from other tobacco producing countries in order to meet the requirement of tobacco growers and to boost the economy of Pakistan. Keeping in view this factor the objective of the said study is to check the performance of FCV hybrids from exotic region mainly Brazil in the agro- climatic conditions of Mardan [4-18].

Objectives

a)   To study the performance of different tobacco (FCV) hybrid and identify suitable hybrid for Mardan region.

b)   To study the morphological characteristics of different FCV hybrids.

Materials and Methods

a)   **Experimental Site:** Tobacco research station (Mardan) is located in the south west of the district at 34°12'0N 72°1'60E and an altitude of 283 meters (928 ft), with the elevation 314 meters above sea level.

b)   **Experimental Design:** The experiment was laid out in RCB design having ten (10) tobacco genotypes replicated three times at the Tobacco Research Station, Khan Garhi, Mardan during 2014-15. Spatial arrangement was done using 90cm row to row and 60cm plant to plant distances.

c)   **Nursery Management:** Nursery was raised on 20th December 2014. Seed rate of 4-5 gm ha^{-1}.Bed size was 10 m long and 1 m wide. Thinning was done 3-4 times from 15 to 20 January. Ten different tobacco genotypes CSC-4302, CSC 447, CSC 4703, CSC-444, Spt-G-28, K-399, PVH-2310, PVH-2275, PVH-2261, PVH2233, were sown.

d)   **Field Preparation:** Before Transplantation land preparation was done using cultivator and rotavator. Good and viable seedlings were transplanted at that same day in the field and irrigation was applied to establish good root system.

e)   **Transplantation:** Transplantation was done on 18th March 2015. Each plot was measured 6 x 2 ft with five rows, having 10 plants in each row. The row to row distance was 3 feet, while plant to plant distance was 2 feet.

f)   **Field Management:** After transplantation irrigations were applied 6-7 times. N:P:K fertilizers were applied with the rate 75:75:75 kg ha^{-1}. After transplantation one dose was applied to the two sides of plants. The topping was done at buttal stage for all the genotypes and was treated with recommended succricide. As harvesting of tobacco is completed in three to five pickings, so before one or two days of corresponding picking of leaves, leaf area was counted with a scale, after 1st picking Green weight of leaves, no. of leaves/kg, Cured weight of leaves, No. of cured leaves/kg, (same pattern was done for 2nd 3rd 4th picking,) Yield hac-1 and chemical analysis i.e. Nicotine and Sugar contents were studied. Physiological and Biochemical Processes to be taken,

g)   **Plant Height (cm):** In each plot thirty plants were selected and were measured from top to bottom and their mean was calculated

h)   **Leaf Area (cm²):** For leaf area, thirty plants randomly were taken then leaf length and breadth was measured. The average leaf size was computed from these ten plants by multiplying with a common factor of 0.644 derived by Suggs, 1960.

$$Leaf\ area\ =\ Leaf\ length\ x\ leaf\ breadth\ x\ 0.644$$

i)   **Leaf Yield (kg ha^{-1}):** Data concerning leaf yield, the weight of cured leaf in each treatment was taken after each picking. The total cured leaf yield was calculated by the following formula:

$$Yield\ \left(kg\ ha^{-1}\right)\ =Cured\ leaf\ weight\ plot^{-1}x\ total\ no.\ of\ plants\ /\ hectare$$

j)   **Leaf Nicotine Content (%):** Nicotine was determined by the method of Cundif and Markunas (1964). The nicotine contents were calculated by the following formula:

$$\frac{V1xNx32.45x100}{weight of the sample}$$

Whereas,

V1=Volume of titrant for non-acetylated aliquote,

N=Normality of perchloric acid.

k)   **Leaf Reducing Sugars (%):** Reducing sugars percentage was estimated as follow:

$$\%\ Reducing\ Sugars\ =\ 25 \times 100 \times 0.05$$

Titrate x wt. of sample

Data collected was analyzed according to RCB design and upon obtaining significant differences; least significant difference (LSD) test was employed Steel and Torrie, 1980.

Results and Discussions

a)   **Plant height:** Statistical analysis of variance showed highly significant (p<0.01) difference for plant height among

different FCV hybrids. Data regarding plant height is shown in Table 1. However, mean values for plant height ranged from 131.8 to 105.4 cm .The tallest plant data was recorded for PVH-2310 and closely followed by PVH-2275 while the shortest plant height was recorded in case of CSC-4703.The plant height is a genetic character of the genotype it could be due to the more efficiency of the nutrients uptake Fida, 2014.

Table 1: Plant height (cm), leaves plant[-1], leaf area (cm²), number of green leaves kg^{-1}, number of cured leaves kg-1of ten FCV tobacco hybrids.

Tobacco hybrids	Plant height	Leaves plant[-1]	Leaf area	Green leaves weight	Cured leaves weight
CSC-447	1889.7 b	27.100 a	938.6 c	20.333 b	142.77
CSC-444	2383.0 b	25.933 abcd	917.5 c	17.667 b	146.67
CSC-4703	2057.1 b	25.500 bcd	1280.4 a	17.500 b	140.20
CSC-4302	2212.6 b	23.633 e	932.4 c	22.167 b	114.97
PVH-2310	4467.1 a	27.300 a	1003.4 b	45.500 a	115.27
PVH-2261	3564.1 a	24.833 cde	917.5 c	47.867 a	121.53
PVH-2233	3928.9 a	26.333 abc	941.6 c	51.867 a	119.10
PVH-2275	3845.2 a	26.667 ab	929.2 c	44.900 a	121.70
K-399	4018.5 a	25.067 cde	678.5 d	49.667 a	140.27
SPT-G-28	3743.5 a	24.767 de	679.6 d	48.300 a	124.50
LSD (0.05)	908.11	1.5410	26.417	7.9009	27.888

b) Number of leaves plant[-1]: Analysis of variance revealed significant ($p<0.01$) difference among the hybrids for number of leaves plant[-1]. Data regarding number of leaves per plant is presented in Table 1. The highest mean value for number of leaves plant-1 was recorded for PVH-2310 followed the rest genotypes. Number of leaves per plant is one of the major indicators for high yield. More number of leaves is a genetic character of the genotype the possible reason could be the more accumulation of photosynthates Qaizar, 2009.

c) Leaf area (cm²): Data regarding leaf area is shown in figure 01. Statistical analysis of variance showed highly significant ($p<0.01$) difference among the hybrids for leaf area. The highest mean value was recorded for CSC-4703 followed by PVH-2310 while the lowest mean value was recorded for K-399 and PVH2261. The possible reason for higher leaf area could be due to the high nutrients uptake efficiency of the hybrids. Hybrids with wide leaf area usually have more positive effect on the cured leaf yield Iqtidar,

2004.

d) Green leaves kg^{-1}: Data regarding green leaves per plant is presented in Table 1. Analysis of variance showed highly significant ($p<0.01$) difference among the hybrids for number of green leaves per kg. Number of green leaves per kg ranged from 17.7 to 51.9. The highest mean value for green leaves per kg was recorded for PVH-2233 and was closely followed by K-399 and G-28while the lowest mean value was recorded for CSC-4703. Less number of green leaves per kg shows the more amounts of nutrients present in the leaf.

e) Cured leaves kg^{-1}: Data regarding number of cured leaves per kg is shown in Table 1. Analysis of variance showed non-significant ($P<0.01$) difference among the hybrids for number of cured leaves per kg. Data for number of cured leaves per kg varied from 115 to 146.7. The highest mean value for cured leaves per kg was observed for CSC-444 and was followed by CSC-447 while the lowest mean value was observed for CSC-4302 and PVH-2310.

Table 2: Cured leaves weight plot[-1], green leaves weight plot[-1], reducing sugar (%), nicotine (%), and yield of ten FCV tobacco hybrids.

Tobacco hybrids	Cured leaves plot[-1]	Green leaves plot[-1]	Reducing sugar (%)	nicotine content(%)	Yield
CSC-447	5.267 b	34.167 c	19.433	1.7667	1889.7 b
CSC-444	6.667 b	44.933 c	19.067	2.4333	2383.0 b
CSC-4703	5.767 b	35.000 c	20.333	2.1000	2057.1 b
CSC-4302	6.667 b	35.367 c	19.733	2.2667	2212.6 b
PVH-2310	12.467 a	80.367 a	17.433	2.5667	4467.1 a
PVH-2261	9.967 a	61.933 b	18.850	2.4500	3564.1 a
PVH-2233	10.967 a	69.067 ab	21.333	2.2100	3928.9 a
PVH-2275	10.733 a	66.033 ab	18.867	2.0000	3845.2 a
K-399	11.200 a	70.700 ab	15.267	2.2567	4018.5 a

SPT-G-28	10.467 a	66.600 ab	17.033	2.4467	3743.5 a
LSD (0.05)	2.5142	14.869	3.4499	0.6898	908.11

f) Cured weight plot⁻¹ (kgs): Data regarding cured weight per plot is shown in Table 2. Analysis of variance showed highly significant (p<0.01) difference among different hybrids for cured weight plot-1. Mean values for cured weight per plot ranged from 12.5 kgs to 5.3 kgs. The highest mean value for cured weight per plot was recorded for PVH-2310 and was followed by K-399 while the lowest mean value was observed for CSC-447 and CSC-4703. The possible reason for the differences of cured weight could be the more accumulation of the macro nutrients within the leaves Imtiaz, 2006.

g) Green weight plot⁻¹ (kg): Data regarding green weight per plot is shown in Table 2. Analysis of variance showed highly significant (p<0.01) difference among the hybrids for green weight plot1. The highest mean value for green leaves per plot was observed for PVH-2233 and K-399 while the lowest mean value was observed for CSC-4703 and CSC-444 (17.7). The possible reason for the differences among the genotypes for green weight per plot could be the genetic ability of the genotype to uptake and accumulate nutrients from the soil and environment Imtiaz, 2006.

h) Cured leaf yield (kg ha⁻¹): Data regarding cured leaf yield is shown in Table 2. Statistical analysis of variance showed highly significant (p<0.01) difference among genotypes of FCV tobacco. However, mean values for yield of FCV tobacco hybrids ranged from 4467.1 kg ha⁻¹ to 1889.7 kg ha⁻¹.The highest mean value for yield was observed for PVH-2310 and K-399 while the lowest mean value was recorded for CSC-447 followed by CSC-4703. The possible reason for the differences among the hybrids for cured leaf yield could be genetic capability of the genotype to produce more yields Imtiaz, 2002.

i) Nicotine content (%): Data regarding % nicotine content of the different FCV tobacco hybrids is shown in table 02.Analysis of variance showed non-significant (p<0.01) difference among 10 FCV tobacco hybrids for % nicotine contents. The highest mean value for % nicotine was calculated in case of PVH-2310 and was followed by PVH-2261 while the lowest mean value was observed for CSC-447.

j) Reducing Sugar (%): Data regarding reducing sugar (%) is showed in Table 2. Analysis of variance showed non-significant (p<0.01) difference among 10 different FCV tobacco hybrids for reducing sugar (%). However, the mean values ranged from 20.3 to 15.3. the highest mean value for reducing sugar(%) was recorded for CSC-2233 and CSC-4704 while the lowest mean value was recorded in case of K-399.

k) Conclusion and Recommendation: It is concluded from the research that different hybrids of FCV tobacco is valuable for improving the yield and quality of flue cured virgina tobacco. Similarly, comparing different hybrids with each other, it was found that yield and quality of Flue Cured Virginia tobacco is improved with different hybrids and thus it is recommended to use PVH-2310 hybrid for higher yield and decent quality of flue cured Virginia tobacco for agro-ecological condition of Mardan.

References

1. Taj FH (1994) Miscellaneous crops Bashir E and B Robyn (eds) Crop Production. Nat Book Foundation, Islamabad, Pakistan.

2. MINFAL (2007) Agricultural Statistics of Pakistan 2005-06. Ministry of Food, Agric., and Livestock Food, Agric And Livestock Div Govt of Pakistan, Islamabad, Pakistan pp. 278.

3. Woras G, EA Hashmi, MZ Qazi and Q Jan (1996) A study of varietal evaluation in Virginia flue-cured tobacco. Pak Tob 20(1&2): 33-3

4. Ahmed M (1978) Production of tobacco in Pakistan. An analytical study of past, present and future trends. Pak Tob II (1): 17-22.

5. Butorac J, J Beljo, J Gunjaca (2004) Study of inheritance of some agronomic and morphological traits in Burley tobacco by graphic analysis of diallel cross. Plant Soil Environ 50(4): 162-167.

6. Chaudhry GA, M Fareed (1982) Association of yield components in tobacco (Nicotianatabacum L). Pak J of Agri Res 3 (2): 122-124.

7. Euphytica (2014) 16(2): 293-299 Sarhad J Agric 30(2).

8. Hashmi EA, G Woras, F Karim, M Shahid and SA Shah (2004) Comparative study of different flue-cured Virginia (FCV) tobacco varieties in NWFP. Pakistan Pak Tob 23(1): 18-20.

9. Idrees QM and S Khan (2001) Effect of different seedling size and NPK doses of fertilizer on the yield and quality of flue-cured Virginia tobacco (NicotianatabaccumL). MSc (Hons) Thesis, Agronomy Department, NWFP Agricultural University, Peshawar, Pakistan.

10. Kara SM and E Esendal (1995) Heterosis and combining ability analysis of some quantitative characters in Turkish tobacco. Tob Res 21(1-2): 16-22.

11. Kara SM and E Esendal (1997) Diallel analysis of some quantitative characters in tobacco (Nicotianatabacum L). Anadolu Journal of Aegean Agricultural Research Institute 7(1): 98-111.

12. Khan A, A Gohar and A Wahab (2011) Statistical Bulletin, Pakistan Tobacco Board, Ministry of Commerce, Government of Pakistan.

13. Shah SMA, A Ahmad, F Mohammad, Hidayat ur Rahman, G Woras, et al. (2008) Genotypic evaluation of some Virginia tobacco varieties for yield and quality traits. Sarhad J Agric 24(4): 607-61

14. Sadeghi SM, E Amin and M Ashouri (2012) An investigation of gene action on different traits of tobacco under Irrigated and drought stress environment. African J of Biotech 11(21): 4740-4751.

15. Sastri AB (1974) Path analysis of yield components in Natu Tobacco. Ind J of Gen Pl Br 34(1): 57-58.

16. Suggs CW, JF Beeman and WE Splinter (1960) Physical properties of green Virginia type tobacco leave 111 relation of leaf length and width to area. Tob Sci 4: 194-197.

17. Qizar A and Muhammad F (2014) yield attributing traits in parents versus hybrids.

18. In FCV tobacco (Nicotianatabacum L). Sarhad J Agric 30(2).

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