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Research Article

INVESTIGATE THE EFFECT OF PLANTING AND DENSITIES PATTERN ON QUANTITATIVE AND QUALITATIVE CHARACTERISTICS VIRGINIA TOBACCO (COKER 347) IN THE WEST REGION GILAN- TALESH

***Sina Kharazmi[1], Reza Taghizadeh[2] and Ali Vahedi[2]**
[1]Department of Agronomy and Plant Breeding, Astara Branch, Islamic Azad University, Astara, Iran
[2]Department of Agronomy and Plant Breeding, Astara Branch, Islamic Azad University, Astara, Iran
**Author for Correspondence*

ABSTRACT
In order to investigate the effect of planting and densities pattern on quantitative and qualitative characteristics Virginia tobacco, an experiment was performed in the form strip plot in randomized complete block design with 12 treatments and three replications in a farm where tobacco was cultivated in the past years in 2012. Factor (A) was intervals between rows 80, 100 and 120 cm as the tapes were tested and factor (B) was considered intervals between plants in the rows at four levels 30, 50, 70 and 90 cm. Seedlings were planted in the second half of May. Traits such as final height of plant, leaf dry weight, and leaf length, leaflet length, dry leaf yield per hectare and number of leaves per plant were examined. Results showed there were significant differences between plants intervals in the row in terms of final height of plant and leaf dry weight at 5% level and in terms of traits such as low back length of the leaf, leaflet length and dry leaf yield per ha at 1% level. The effect of row distance per dry leaf yield was significant at 5% level. Interaction (the effect of row distance × distance on the row) or planting pattern was significant in terms of traits such as final height plant, number of plant leaves, leaf dry weight, leaflet length and dry leaf yield on 1 acre at 1% level. Planting patterns 70 × 100 and densities of (14285) plant per ha is advisable for Virginia Coker 347 cultivar in the study area.

INTRODUCTION
Tobacco is one of the major industrial products in the world which has an important role in the economy of manufacturer countries. The growing interest of people towards smoking caused tobacco is considered as a valuable plant in any country's economy and even in the World Trade (Asghari, 2006). Increase agricultural production is possible in two ways, increase the cultivation and increase the yield per unit area. Due to the limitation of natural resources (soil, water, etc), inevitably it should be attempt of increase in yield which is the main purpose of cultivation (Khajepour, 2000). Determine the optimal density is one of the important factors to get the maximum yield due to the climatic conditions of each region and specifications of varieties are cultivated (Noormohammadi *et al.,* 1997). The purpose of determine the optimal density is spacing between plants, so that an appropriate combination of environmental factors provided to achieve maximum performance with possible quality (Talebiyan, 1992). In considering an appropriate density, mutual ghosting is minimized and light thus photosynthesis is maximized (Esparagou and Dadler, 1988). If the planting spaces are too common, certainly the number of plants per unit area reduced and the yield will be faced with a deficit. However, if the planting spaces are too low and planting density is high, competition occurs within the species and that the yield will be reduced (Mazaheri, 1998). Katahira and Motomura (1999) believe that plant density can have an impact on the number of leaves and with increasing density and distance from the desired density, number of branches per plant and the number of leaves is reduced. On the other hand, with increasing plant density, water uses efficiency increase. Due to the efficiency of water use in the product increase, desirable high density is needed to achieve a high performance. In the high density, the number of leaves is lower and straps are longer. And therefore under circumstances where there is intense competition between plants, the number of leaves significantly reduced. And even plants may be unable to pass completely its growth cycle (Andreev *et al.,* 2004). Ashkesh *et al.,* (1997) in the determination of most appropriate cultivation

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distance and its effect on quantitative and qualitative properties of Coker 347 reported with decreasing cultivation distance, yield increases. But the quality of tobacco and leaves dimensions has backfired. The maximum price of a kilogram tobacco and dimensions was achieved by increasing the spacing. Less distance nicotine and sugar respectively decrease and increase and a total distance of 50 * 100 a density of 20000 plants ha was higher than other treatments. Pazelly *et al.*, (1980) effect of plant density on the cultivar W 113 reported that low plant density increase leaf length and width, and the average price of a kilo of tobacco. Shariatmadari *et al.*, (1986) reported close intervals plants make them competitive to absorb water and nutrients and consequently plant growth will not be enough. And more intervals cause the development and growth of roots and also enlargement and thickening of leaves. And proper intervals will attract a balanced food of plants. Mahdavi and Gholizadeh (2008) in examine the effects of plant density and different levels of fertilizer on quantitative and qualitative characteristics of cultivar K 326 concluded the effect of plant density on leaf length and width, plant height, stem diameter and green leaf yield has significant difference at 1% level. Comparison of different levels treatments on plant per ha within 2 years shown that density 16600 plants per ha with 62, 27.2 cm and 24.6 mm had the highest leaf length and width, stem diameter and density 25000 plants per ha with 24670 and 4252 kg.ha had the highest leaf yield. Alavi and Taghavi (2009) in the effect of plant density on quantitative and qualitative characteristics of male sterile Barrel-type tobacco in Orumieh region concluded that there are significant differences between plant densities in terms of green leaf yield single plant, green leaf yield per hectare and dry leaf yield per plant.
The purpose of this study was to investigate the planting pattern and appropriate density Virginia tobacco (Coker 347) in order to achieve high performance and quality.

MATERIALS AND METHODS

This experiment was performed in the agricultural farm located in Jokandan, 5 km from Talesh, Gilan with 48 ° and 53 min east longitude and 37 ° and 50 min north latitude and the height 50 m above sea level, in the second half of May, 2012. According to the meteorological, the type of climate temperate zone in northern Iran, Caspian southwest is with an average rainfall of 93.8 mm in 2011.

The experiment was performed in the form strip plot in a randomized complete block design with 12 treatments and three replications. Factor (A) was distance between rows 80, 100 and 120 cm and factor (B) was considered distances between plants in rows at four levels 30, 50, 70 and 90 cm. Coker cultivars (347) was used in this study. In order to prepare, the arable land was plowed by the moldboard. Then for crushing clods and uniform soil condition, the ground was troweled and extra clods and foliage was collected. Then the sampling was performed from depth of 0 to 60 cm of the soil. The amount of fertilizer was given based on the results of soil analysis (Table 1).

Repetitions distance was considered 2 m of each other. Seedlings were reared by planting seeds method in the special chassis and floating in water inside the plastic casing. And they were transferred to the main land in the second half of May, 2012. Seedling to prepare tobacco in the treasury took place in the form float system in March 20, 2011. The seedlings were transferred to the main field in the second half of May 2012.

The seedlings operation was conducted in the flat earth. Five characters were evaluated in this experiment such as, final height plant, number of leaves per plant, leaf dry weight, and leaf back length, leaflet length and dry leaf yield in a hectare. MSTAT-C statistical software was used to perform the analysis of variance and mean comparison by Duncan test (at 5% level) and software EXCEL was used for drawing diagrams.

Table 1: Results of soil analysis testing in 2012

K (PPm)	P (PPm)	N(٪)	cL (meg/lit)	Ec(ds/m)	Depth
370	29	0.2	0.5	1.23	0-60

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RESULTS AND DISCUSSION

Final Height

Effect of plant spacing in the row was significant at 5% level (Table 2). Maximum height belonged to the plant spacing in row 50, 70 and 90 cm (Table 3). At low densities, low competition between adjacent plants will grow most plants. However, with increased density, height declined due to increase competition. At higher densities, the height increased due to the ghosting adjacent plants and greater competition for light. The interaction of row spacing on plant has been between planting pattern row on the height and it was significant at 5% level. Row 80 apart from planting spaces and between rows 50 cm which had the minimum height between treatments, other treatments were statistically significant in group a and there were no significant differences (Figure 1).

Leaf Dry Weight

Effect of plant spacing in the row on the leaf dry weight was significant at 5% level (Table 2). According to Duncan's test results, the highest leaf dry weight belonged to plant spaces 50 and 90 cm (Table 3). The interaction of row spacing on space on the row was significant at 5% level (Table 2). Spacing of 50 × 80, 80 × 90, 30 × 100 and 120 × 90 with the highest leaf dry weight were in group a and there were no significant differences (Figure 2).

Leaf Back Length

Effect of plant spacing in the row on the leaf back length was significant at 1% level (Table 2). According to Duncan's test results, the highest leaf back length belonged to plant spaces in row of 70 and 90 cm (Table 3).

Leaflet Length

Results of mean-square table showed the effect of plant spacing in the row was significant at 1% level (Table 2). Maximum leaflet length belonged to the plant spacing in row 70 and 90 cm (Table 3). The interaction of row spacing on plant between the rows on the leaflet length was significant at 1% level (Table 2). Except a space 50 × 80 cm located in group c and space 30 × 80 cm located in group b, other treatments were statistically in group a and had more leaflet length than planting above (Figure 3).

Dry Leaf Yield per ha

Effect of plant spacing on the yield of dry leaf at one ha was significant at 1% level (Table 2). The maximum yield of dry leaf belonged to the plant spacing in the row 70 cm (Table 3). Effect of row spacing on the yield of dry leaf at one ha was significant at 5% level (Table 2).

Table 2: Results of variance analysis in the traits studied

S.O.V	df	MS					
		The final height of lants	Number of Plant leaves	Leaf dry weight	Leaf back length	Leaflet length	Dry leaf yield per hectare
Repeat (R)	2	231.434	1.968	47717.694	2.034	35.503	14806603.58
Row interval (A)	2	471.714^{ns}	2.416^{ns}	956.861^{ns}	23.738^{ns}	73.943^{ns}	79818211.08*
Error A (a) E	4	199.879	0.693	19628.861	56.611	14.957	5769914.17
Plant interval in the row (B)	3	350.671*	6.237^{ns}	48228.74*	31.719**	132.07**	250242048.3**
Error B (b) E	6	43.006	1.876	7875.769	2.5	10.991	5014800.88
AB Interaction	6	443.944*	4.273*	60803.27*	14.416^{ns}	117.217**	40094958.17**
Total error C	12	143.091	0.86	17363.713	7.001	16.975	8072616.63
CV%		7.64	4.61	18.10	4.95	8.92	20.51

** and ** Significantly at p < 0.05 and < 0.01, respectively.*

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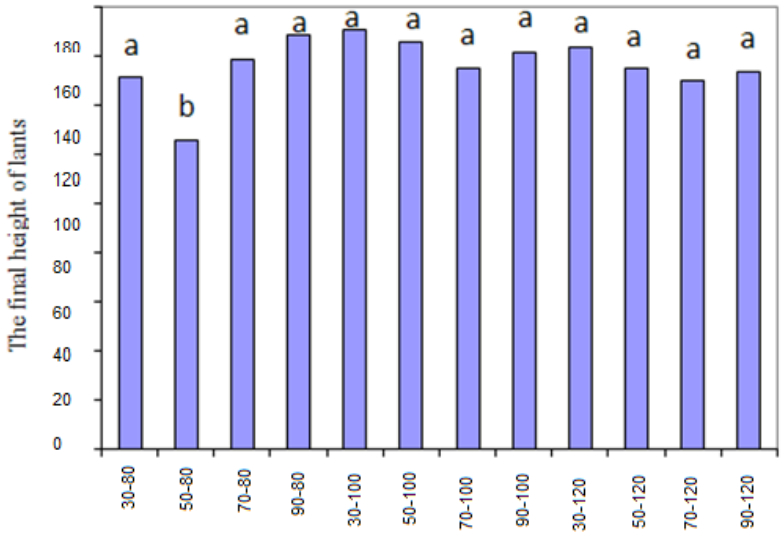

Figure 1: Effect of planting pattern (interaction between row and between rows space) on plant height

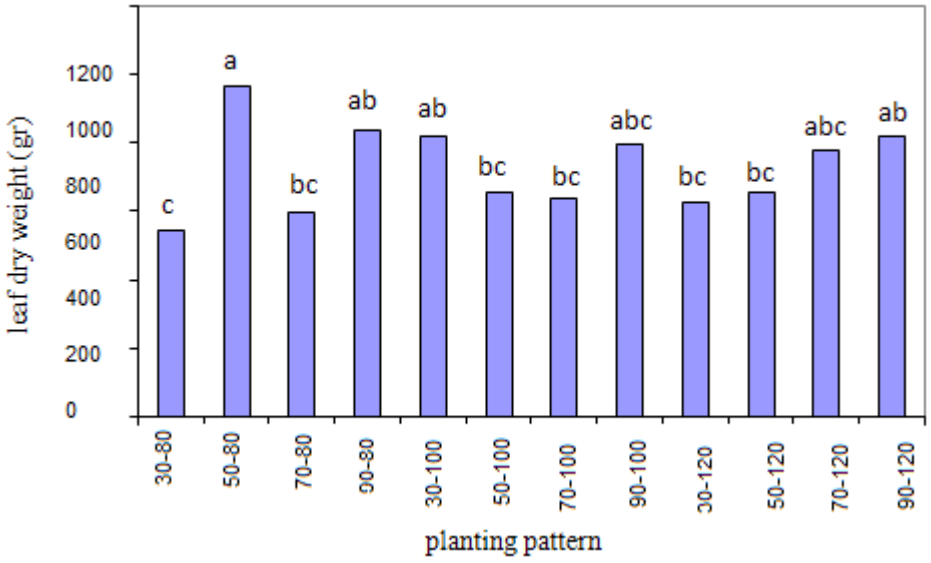

Figure 2: Effect of planting pattern (interaction between row and between rows space) on leaf dry weight

Table 3: Simple effect of plant interval in the row (cm)

Trait	Plant interval in the row (B)			
	20	**50**	**70**	**90**
The final height of lants	161.844[a]	148.689[b]	154.356[ab]	161.267[a]
Leaf dry weight	52.933b[c]	51.178[c]	54.022[ab]	55.644[a]
Leaf back length	45.844[b]	41.089[c]	47.533[ab]	50.2[a]
Leaflet length	663.889[b]	758.111[ab]	672.333[a]	817.222[b]
Dry leaf yield per hectare	9708.333[c]	16053.556[b]	20274.778[a]	9363.667[c]

Differences between averages of each column which have common characters are not significant at probability level of 5%

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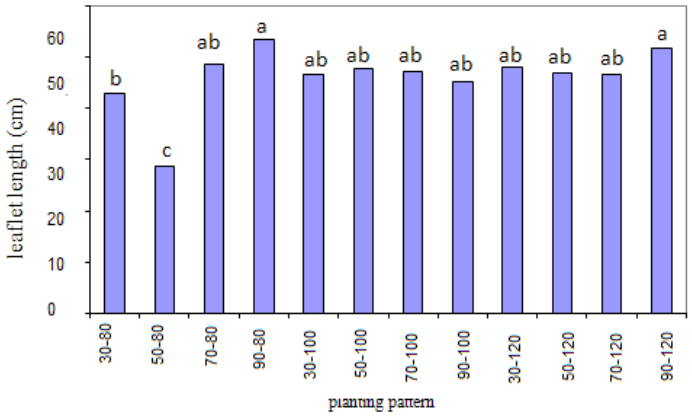

Figure 3: Effect of planting pattern (interaction between row and between rows space) on leaflet length

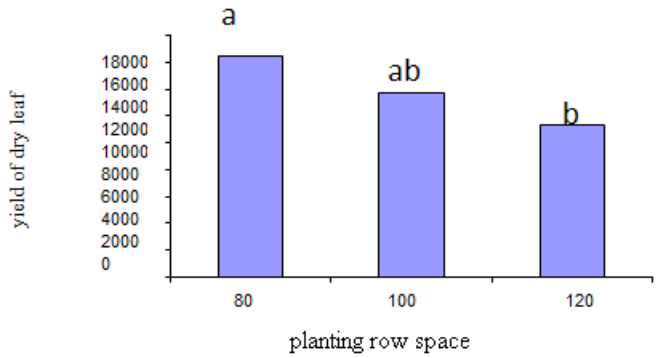

Figure 4: Simple effect of planting row space on the yield of dry leaf

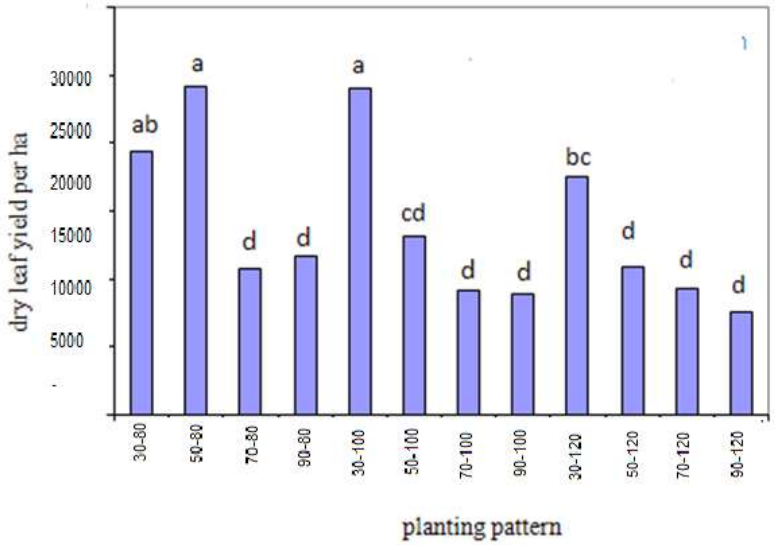

Figure 5: Effect of planting pattern (interaction between row and between rows space) on the dry leaf yield per ha

The maximum yield of dry leaf belonged to the rows spacing of 80 and 100 cm (Figure 4). The interaction of row spacing and planting pattern in terms of dry leaf yield per hectare was significant at 1% level

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(Table 2). Spacing 50 × 80 and 30 × 80 and 30 × 100 were allocated to the highest dry leaf yield (Figure 5).

Conclusion

Given that the purpose of tobacco cultivation is the use of dry leaves of this plant. Thus, the production of greenhouse tobacco with larger leaves and optimal efficiencies with increasing cultivation intervals and intervals plant on the row (reduce the density) is recommended. The results of this experiment showed cultivation intervals 70 × 100 for Virginia tobacco (Coker 374) in the West of Gilan- Talesh province is suitable densities equal with (14 285) per hectare.

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