

## Investigating Some Qualitative Characteristics of 2 Cultivation Paradigms related to Single Cross Corn 704 in Combined Cultivation to Sorghum Grain

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### ABSTRACT

In order to eco-physiological aspects of (*Sorghum bicolor* L. Moench) intercropping in two planting pattern of single cross corn 704 (*Zea mays* L.) in Och-Tappe village of Miandoab from 2004 to 2005. The experiment design was factorial in RCBD arrangement with three replications. The treatments were: a combination of three levels of Sorghum densities (4, 8 and 16 plants per meter of corn row) and two planting patterns (common and two zigzag rows) of corn. The treatments lacking corn weed in two planting pattern was considered as control. Seeds of Sorghum were planted on the sides and end of corn rows in zigzag between corn plants. Results showed that with increased Sorghum population the amount of protein of seeds and the amount of chlorophyll of corn leaf decreased and the amount of corn oil increased. Zigzag planting pattern of two rows caused increase in protein of seeds and decrease of amount of oil in corn seeds. The effect of Sorghum densities on studied characteristics of corn was greater than effect of different planting pattern. The effect of Sorghum density caused significant decrease in chlorophyll amount of leaves.

**Keywords:** corn, Sorghum, inter cropping, density, planting pattern.

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### INTRODUCTION

Stable agriculture is a dynamic concept which identifies future necessities of production increase and preserves environment quality and water and soil resource capacities [1]. Stable agriculture is a food production method which is of total and sufficient environment, economic and society [2]. The aims of agricultural production is on the basis of natural processes such as variety existence, material circle, lacking chemical material utilization and lacking focus on its production and distribution [2].

One important instance of this agriculture is multi-cultivation system. Combined cultivation which is a main form of multi-cultivation increases agricultural performance in the case that it is managed right and regularly. This increase will be caused by optimized utilizing of environmental resources, decrease of pests and other plant diseases, controlling weeds, existing suitable microclimate which decreases wind speed and some other reasons. Combined cultivation is of high significance in agriculture and stockbreeding. In combined cultivation, more volume of soil is utilized and there are much more remnants than mono-cultivation so, there will be more humus and food stuffs [2].

Combined cultivation of corn and sorghum as 2 C<sub>4</sub> plants can be of great production according to high resistance of sorghum in dryness [3]. Corn is the third mostly cultivated grain with 138.5 million hectares cultivation and 589.4 million tones production in the world after wheat and rice [1]. Tulnar [3] believes that 20 tones grain is produced in a hectare from present hybrids according to performance records. Increase of corn performance potential does not seem a suitable genetic strategy. Modern hybrids of corn show more resistance to high cultivation densities and improvement of tension resistances such as weed interference, low nitrogen of soil and moisture seem necessary. Spatial arrangement means horizontal plan of plant accumulation and distribution which affect reciprocal relations among peripheral plants. Fisher and Miles [4] represented that plant arrangements (cultivation paradigm) is a significant factor in interference in a way that the least benefit is gained by weeds in plant cultivations of square and triangular. 2-lined zigzag cultivation paradigm increases light absorption, chlorophyll of leaves, performance, performance elements and other characteristics of plant. Banman [5] reported that the main reason of different light absorption of canopy is different structural elements, morphological characteristics and primary speed of each species. Bazrafshan et al. [6] concluded that cultivation paradigm affected dry material, green corn performance, grain performance and plant height which were the most in 2-lined cultivation. The aim of this study is investigating some qualitative characteristics of combined cultivation related to sorghum in 2 cultivation paradigms of single cross corn 704.

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## MATERIALS AND METHODS

This study was performed in a farm in OochTapekurd village located in Miandoab of West Azerbaijan province. Average annual rainfall of experiment site is 312mm and the soil was sand-loam. The experiment was done every 2 years in factorial form on the basis of accidental blocks in 3 replicates. Single cross corn 704 with equal density in 2 levels of common and 2-lined zigzag cultivation and grained sorghum in 3 levels containing 4, 8 and 12 plants in a meter were studied. Also a control treatment of pure sorghum was supposed as control. Every 2-year experiment's information was variance analyzed separately. Then, 2-year variances were tested equally for each characteristic and characteristics of equal variances were tested combined along 2-year experiment. Variance analysis of data was done in factorial form and accidental blocks through SAS system. The means were compared on the basis of Duncan's multiple range test and the graphs were drawn through Excel system.

## RESULTS AND DISCUSSION

Various cultivation paradigm of corn in possibility level of 5% affected significantly protein and oil of corn grain. Different densities of sorghum grain affected corn grain oil in possibility level of 5% and affected corn grains and chlorophyll of corn leaf in possibility level of 1%.

Sorghum density significantly decreased leaf chlorophyll in 1% level. SeyyedSharifi *et al.* [7] investigated density and interference periods of sorghum on corn growth and concluded that the more the density and interference period, the less total biomass, relative growth, pure absorption velocity and production growth will be. This can be resulted from decrease of leaf surface, competition and plant shadows on each other according to light resource accessibility. SeyyedSharifi *et al.* [8] studied density and interference of sorghum on growth performance of corn and resulted that the increase of density and interference period will increase plant height and decrease corn performance. Investigations showed that the production quality can be affected by competition of surrounded plant. Mac Mollan *et al.* [9] declared that competition of a plant to canola can significantly decrease canola's performance up to stage 4-8 leaves [10]. Baruz and Olsen [11] reported that protein of wheat grain will decrease because of surrounded plant's competition but these decreases are attributed to decrease of nitrogen [4].

Table1. Combined variance analysis of corn characteristics

Change resources	Freedom degree	Protein of corn grain	Oil of corn grain	Chlorophyll of leaf
Year	1	154/42	504/71	21362/19
Year/replica	4	3666/42	26662/56	9841/73
Treatment a paradigm (corn)	1	3160/72*	1006/41*	31644/23
Treatment b densities (sorghum)	2	2128/45**	19285/04*	11215/56**
year× treatment a	1	2084/85	12047/76	190862/05
year× treatment b	2	17229/67	3977/07	213615/38
a× b	2	36033/14	13259/53	804121/11
year× a× b	2	59632/37	13096/04	310765/06
Error of b	20	32597/46	1056/33	160169/61
C.V		7/36	6/92	9/33

\* and \*\* respectively represent significance of 1 and 5 percentages

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