

# Studying the yield components in the intercropping of *Zea mays* var. *saccharata* and *Phaseolus vulgaris* L. in Khuzestan

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## Abstract

With the growing world population, the destruction and imbalance of ecology continued and thus the steps should be taken to increase the agricultural production and environmental protection. Up to now, the different things have been done to increase the crop and horticultural products such as the use of technology, genetics, chemical fertilizers and pesticide. In intercropping, the surface of cultivation is better used and thus more soil is covered by aerial organs and roots (underground) of plants and thus, the soil erosion leaching reaches to the lowest amount. If in intercropping a mixture of Leguminous plants is used, these plants will stabilize the air nitrogen and some of it will be available to neighboring plant in the same growing season and some of it will be available to the plant in the next cultivation. To study the response, in this experiment the sweet corn (as main product) and green beans (as secondary product) in intercropping were used and the experiments were conducted in the years of 2012 to 2014 in six cropping patterns as the sole cropping and their intercropping. The experiment was conducted in Khuzestan in the city of Sardasht in a completely randomized block design with four replications in three different planting years that its treatments contained 6 different cropping patterns from both products (8) . Among six cropping patterns, the usefulness of alternate cropping pattern of sweet corn, the hybrid variety of sw404, and the green beans, Sunray variety, on the separate lines (alternately) was better than the sole cropping and intercropping and it was consistent with the results obtained by Francis et al 1984 and 1985 and is recommended as the most suitable intercropping pattern.

**Keywords:** intercropping, pattern, phenology, variety, sweet corn, green beans

## **Introduction**

Most of the research conducted on intercropping has been focused on the usefulness of the yield and other benefits of intercropping such as better control of weeds, pest and disease, as well as better use of light and food sources are less considered (5 and 6). Some researchers believe that the exploitation of resources in the intercropping is more than monoculture farming and it results in better control of weeds in intercropping than monoculture farming. But it seems that the weed control in intercropping is at least superior to one of the mixed components in monoculture farming. The ability of intercropping to compete with weeds depends on different factors, such as the combination of crops, selected cultivars, plant density, and the share of each crop in intercropping, their distance from each other and fertility and moisture conditions of the soil (3 and 7).

In intercropping the maximum yield is obtained when the mixed plants are quite different with each other in terms of the way and amount of using the natural resources. Thus, if these plants with different morphological characteristics are planted in the proximity of each other, they will be able to use the environmental factors. As a result, total yield will increase per unit area (4). When the water is used as a limiting factor, intercropping is useful in terms of water use (6). We can neutralize the disadvantages of roots of some plants by using the intercropping method (3).

In intercropping, larger size of soil is also used; on the other hand, other crop residues that remain in the soil in this kind of agriculture will be more and more diverse. Therefore, more humus is provided in the soil and the soil become more fertile (5) The research aims to study the intercropping of commercial beans and maize and compare it with their monoculture.

## **Materials and methods**

In this study, the sweet corn, variety of ksc 404 sw and the green beans, Sunray variety, were intercropped and the experiments were conducted in three years (2009 to 2011) in the six cropping patterns as sole cropping and intercropping. In these experiments that were conducted in Khuzestan in the city of Sardasht, the distance between the planting lines for corn was constantly considered 75 cm and the distance of bean from the corn was considered 15 cm while the practical length of each line was 5.74 m with 15 holes on each line. The area of each plot was considered 4.6 square meters and there were 7 planting lines in each plot. For this research, also once in the spring the surface plowing, disk operations, levelling, and creating the creek were performed and the phosphate and nitrogen fertilizers were calculated 300 and 200 kg, respectively, and were given to the land before planting. Fighting the weeds was for mechanically done several times. The chemical control was not possible due to planting two needle-leaf and broadleaf plants. Since the aim of this project was studying the maize and bean seed yield per unit area, the main characteristics of corn yield component such as plant height, number and row of seed as well as the diameter and ear length and 1000 seed weight were measured. 100 seed weight of bean, the average number of pods per plant and the average number of seeds per pod were measured. The varieties used in this experiment also include the cultivar of sweet corn, hybrid variety of Ksc 404 sw and green bean, Sunray variety. LER was used for evaluating the intercropping in this experiment. MSTAT-C was used for the calculations.

**Table 1. Some physical and chemical characteristics of the soil**

| Depth (Cm) | salinity EC (ds/m) | acidity (PH) | Soil texture | organic carbon OC% | Nitrogen N% | Phosphorus P% | Potassium K (ppm) |
|------------|--------------------|--------------|--------------|--------------------|-------------|---------------|-------------------|
| 0-30       | 0.77               | 8.92         | Sandy loam   | 0.53               | 0.086       | 7.74          | 270               |

## Results and Discussion

Among six cropping patterns, the usefulness of alternate cropping pattern of sweet corn and green bean in every other line was better than the sole cropping and intercropping and it was consistent with the results obtained by Francis et al in 1984 and 1985 and is recommended as the most suitable intercropping pattern.

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