

GROWTH, DEVELOPMENT AND YIELD OF SUMMER GROWN SOYBEAN IN IRRIGATED SIEROZEM SOIL OF THE TASHKENT PROVINCE, UZBEKISTAN

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Annotation: *After independence of the Republic of Uzbekistan in 1991 there were drastic changes in farming system. Before the country independence, farmers in Uzbekistan had grown sole crop in a year such as cotton, maize and alfalfa. A number of crops are grown in cotton rotations rapidly increased to about 30 crops after the country independence. In the field experiment carried out in 2006 and 2007 in irrigated typical sierozem soil of the Tashkent Province we investigated possibility of obtaining two to three yields in a year and the crops impact on soil fertility. We found that summer cultivation of the double component crops (oats + green peas) and triple component crops (oats + green peas + rye) after winter wheat in the cotton-winter wheat based short rotations increased soil organic matter in the 0-30 cm soil layers from 0.014 to 0.037%, total nitrogen from 0.015 to 0.025%, and total phosphorus from 0.010 to 0.015%. Grain yield of winter wheat obtained in the experiment was ranging from 6.72 to 6.98 t ha⁻¹, and from 2.47 to 2.69 t ha⁻¹ for soybean grain, and both totaled from 9.2 to 9.7 t ha⁻¹ of grain yield per year.*

The purpose of economic reforms conducted by Uzbekistan's government in agriculture is to increase food production for the country population, fodder for livestock and other agricultural products for industry. Prudent use of irrigated lands in agriculture, proper choice the crop rotations and crop species in the cotton rotations, increase crops yields, and improve soil fertility are important tasks of our days.

Soybean is one important crop among legume crops which significantly contributes in improving of soil fertility. Efficiency of soybean cultivation was studied in Uzbekistan by many researches such as K.Mirzajanov and M.Nasriddinov (1982), A. Panjiev (1986), E.Gorelov and D.Yarmatova (1983) and others. However, introduction of wheat based rotations in Uzbekistan's agriculture requires new investigations on soil, crop, yield and other issues.

The field experiment was carried out in irrigated typical sierozem soil of the Experiment Station of Uzbekistan Cotton Research Institute. Level of ground water is about 20 meters, soil texture is heavy loam, the experiment was conducted according to "Methods of field experimentation with irrigated crops" (Tashkent, Uzbekistan Cotton Research Institute, 2007).

The field experiment comprised the following treatments: Treatment 1 - cotton (control), Treatment 2 - 1:1 (1 yr cotton : winter wheat + soybeans 1 yr cotton), Treatment 3 - 1:2 (1 yr winter wheat crop + soybeans as a summer crop : 2 yr cotton), Treatment 4 - 1:2 (1 yr winter wheat + soybean as a summer crop followed by intercropping of oats and green peas as a winter crop for green manuring : 2 yr cotton); Treatment 5 - 1:2 (1 yr winter wheat + soybean as a summer crop followed by intercropping of oats, green peas and winter rye as a winter crop for green manuring : 2 yr cotton); Treatment 6 - 2:1 (1 yr winter wheat + soybean

as a summer crop : 1 yr winter wheat + soybean as a summer crop followed by intercropping of oat, green peas and winter rye): 1 yr cotton.

Soybean (*cv. Orzu*) as summer crop was planted after winter wheat harvest. Field was irrigated using 50 mm of irrigation water before seeding of the crop which was followed by tillage and soil preparation for planting. Soybean was seeded at the rate of 60 kg ha⁻¹, fertilizer and irrigation norms were N₆₀ P₉₀ K₆₀ kg ha⁻¹ and 150 mm applied during the crop vegetative season. Soybean was cropped for grain and yield was harvested during the first decade of October each year.

The first year results of the study showed that depending of the treatments the yield components were ranging as following: plant height - from 91.6 to 98.8 cm; number of pods per plant - from 46.6 to 50.1 pieces; number of grains per pod - from 2.3 to 2.5 pieces; weight of grain per plant - from 0.30 to 0.31 gram; weight of 1000 grains - from 105 to 106 gram and grain yield - from 2.62 to 2.69 t ha⁻¹ (Table 1).

Table 1. Growth, development and yield of soybean

| Number of treatments | Crop rotation schemes | At end of vegetative season (October 01) | | Number of grain in pods (piece) | Weight of grain per pod (g) | Weight of 1000 grains (g) | Grain yield (t ha ⁻¹) |
|----------------------|---|--|------------------------|---------------------------------|-----------------------------|---------------------------|-----------------------------------|
| | | Height of plant (cm) | Number of pods (piece) | | | | |
| Year of 2020 | | | | | | | |
| | 1:2 (1 yr winter wheat crop + soybeans as a summer crop : 2 yr cotton) | 98,8 | 49,5 | 2,4 | 0,30 | 105 | 2.62 |
| | 1:2 (1 yr winter wheat + soybean as a summer crop followed by intercropping of oats and green peas as a winter crop for green manuring : 2 yr cotton) | 93,0 | 46,6 | 2,5 | 0,31 | 106 | 2.49 |
| | 1:2 (1 yr winter wheat + soybean as a summer crop followed by intercropping of oats, green peas and winter rye as a winter crop for green manuring : 2 yr cotton) | 91,6 | 50,0 | 2,3 | 0,31 | 106 | 2.69 |
| | T6 - 2:1 (1 yr winter wheat + soybean as a summer crop : 1 yr winter wheat + soybean as a summer crop followed by intercropping of oat, green peas and winter rye: 1 yr cotton) | 93,2 | 50,1 | 2,4 | 0,31 | 105 | 2.62 |
| Year of 2021 | | | | | | | |
| | 1:1 (1 yr cotton : winter wheat + soybeans 1 yr cotton) | 89,8 | 49,0 | 2,1 | 0,22 | 105 | 2.58 |
| | T6 - 2:1 (1 yr winter wheat + | 98,5 | 46,5 | 2,3 | 0,24 | 105 | 2.47 |

| | | | | | | |
|---|--|--|--|--|--|--|
| soybean as a summer crop : 1 yr winter wheat + soybean as a summer crop followed by intercropping of oat, green peas and winter rye: 1 yr cotton) | | | | | | |
|---|--|--|--|--|--|--|

In the second year of the experiment the results on the yield components were as follows: plant height - 89.5 cm for T2 and 98.5 cm for T6; number of pods per plant - 49.0 and 46.5 pieces; number of grains per pod - 2.1 and 2.3 pieces; weight of grain per plant - 0.22 and 0.24 gram; weight of 1000 grains - 105 and 105 gram and grain yield - 2.58 and 2.47 t ha⁻¹ for T 2 and T6 respectively.

The study results also showed that cultivation of the double component crops (oats + green peas) and triple component crops (oats + green peas + rye) as the summer crop after winter wheat in the short cotton rotations increased soil organic matter in the 0-30 cm soil layers from 0.014 to 0.037%, total nitrogen from 0.015 to 0.025%, and total phosphorus from 0.010 to 0.015%. Wheat and soybean grain yields in the experiment ranged from 6.72 to 6.98 t ha⁻¹ and from 2.47 to 2.69 t ha⁻¹ correspondingly, and grain yield obtained in a year from both wheat and soybean crops totaled 9.2 to 9.7 t ha⁻¹.

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