CROP AND QUALITY FORMATION OF
SOYBEAN Sorts IN DEPENDING ON NORMS
OF PHOSPHORUS

Kh. Atabaeva, I. Abidov

Tashkent State Agrarian University, Uzbekistan
2, Universitetskaya Str., Tashkent 700183 Uzbekistan
abitov_inur@mail.ru

Abstract. The research work was conducted in the conditions of irrigated typical grey soil. There is studied the influence of phosphorus (50, 100, 150 and 200 kg/ha) on the preceding fertilization of 50 kg nitrogen and 75 kg potassium for grain crop formation in this experience. It is established that optimum phosphorus norm of operating substance 100 kg/ha in the typical grey soil condition, which provide grain yield of the “Orzu” sort of soybean in average 25,1 s/ha for 3 years, and “Genetic41” sort of soybean in average 23,6 s/ha for 2 years at the after reap of the winter wheat harvesting. In comparison with the control, the yield of the sort of soybean “Orzu” has increased by 40, 2 %, the sort of soybean “Genetic-2” has increased by 47, 5 %. The maximum number of beans and seeds of the sort “Orzu” are reached 50,4 and 93; beans and seeds of the sort “Genetic-1” are reached 69,2 and 100,8.

Keywords: soya, sort, crop harvest, quality, phosphorus, norm, protein, oil, seeding, irrigate, beans, grain, branches, weight, preceding fertilization, plant, pulse crops, typical grey soil, technology, after reap crops.

Introduction

The valuable crop soybean is of great importance in the decision of the task of increasing the producing of grains and solving the problem of protein. Soybean is the precious raw material for food production. There are rather useful qualities such as the high maintenance of proteins and oil. Different sorts of soybean contain to 57% prof dietary proteins, to 27% easy accessible polyunsaturated oil and 30 % of carbohydrates (mainly monosaccharide and disaccharide), there are vitamins and biologic active matters.

It is necessary to study the cultivation methods in the specific soil-climatic conditions to inculcate this crop to the agriculture of the country widely. There is some soybean growing experience in various soil types in Uzbekistan.

The basic area is engaged by cotton and wheat in irrigated conditions. More than a million hectares of irrigated area become free after the winter wheat in the middle of summer. Soil-climatic conditions make it possible to grow else more grain crop after winter wheat harvesting. For rational use of the irrigated areas and for getting an additional valuable crop it is expedient to practice after reap sowing the sorts of soybean.

The soybean as all pulse crops is required to phosphorus. Phosphorus provides a resistance development, tolerance to environmental factors, raises productivity and quality of grain (Agafonov, 2005; Dovgal, 1983; Kormilicyn, 1999; Kapoor and Gupta, 1977).

Place of conducting the research

Field researches are conducted in 2012-2013 on the Experimental station of the Tashkent State Agrarian University. The experimental station is located near Tashkent in the top part of a watercourse of Chirchik River in Kibray district of the Tashkent area, at height of 481 m above sea level. The soil of the experimental station is typical grey soil of the old irrigation, not salted, with the small maintenance (on horizons of soil of 0-30 and 30-50 sm) humus 0,925-0,715 %, nitrogen 0,082-0,066 %, phosphorus 0,153 0,139 %, potassium2, 30-1, 80 % i.e. soil supplying nutrients are low. The soil classified with weak structure, good water penetration with high capillary. Soil solution reaction is weakly salinized.

Method

Objects of researches: soya sorts “Orzu” and “Genetic”, norms of phosphorus from 50 to 200 kg on the preceding fertilization of 50 kg of nitrogen and 75 kg potassium.

Methods: Used the field and laboratory methods of reaches, elaborated by Uzbek scientific research institute of cotton growing. Used phenological observations on “State strain testing methodology of the
agricultural crops” (Fedin, 1985), statistical working data of the “Field experience methods” (Dospekho v, 1985). Field experiences are conducted in four multiple frequencies. The area of plot is 56 m\(^2\). Number of registration plants – 20 from each plot. A total area of each variant is 124 m\(^2\), the general number of registration plants-80. There are conducted phenological observations and biometric measurements in the experience.

Crude oil was determined by the method of non-fat residue in the Soklet devise: proteins were determined by multiplication of nitrogen’s quantity to factor 6, 25. Nitrogen was defined by method Keldal.

**Technology of cultivation of a soya in the experience**

Soybean sorts were sowed in second half of June after winter wheat harvesting. Before sowing was done spade-work of soil than were sowed. The soya was sowed wide-row method, by the norm of seeding on hectare of 500 thousand of germinate seeds.

**Results**

On the sowing have received 100% of germinations and to the end of the vegetation by experience variants remained 97-99 % of plants. The main result of the researches is the yield, its elements and quality of seed-grain.

Applying of mineral fertilizers has influenced to the growth of plants of the sorts of soya. On the control (without fertilizers), the height of stalks of the sort “Orzu” on the average for 3 years has made 64,4 sm, on the applying 50 kg of nitrogen and 75 kg potassium (preceding fertilization) the stalk height has increased to 6,4 sm. On the applying of different norms of phosphorus on the preceding fertilization of 50 kg of nitrogen and 75 kg of potassium the height of plants increased to norm – 100 sm. At that, the addition made up 5,8 sm in comparison with the preceding fertilization and 12,8 sm in comparison with the control.

<table>
<thead>
<tr>
<th>No.</th>
<th>Variants</th>
<th>Height of stalks. (sm)</th>
<th>Yield of grains (mc/ha)</th>
<th>Bean</th>
<th>Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number</td>
<td>Weight gram</td>
</tr>
<tr>
<td>1</td>
<td>NoPoKo</td>
<td>64,4</td>
<td>17,9</td>
<td>32,4</td>
<td>16,0</td>
</tr>
<tr>
<td>2</td>
<td>N(<em>{50}) K(</em>{75})</td>
<td>70,8</td>
<td>19,7</td>
<td>39,7</td>
<td>19,7</td>
</tr>
<tr>
<td>3</td>
<td>p.f + P(_{50})</td>
<td>71,5</td>
<td>23,0</td>
<td>45,8</td>
<td>22,8</td>
</tr>
<tr>
<td>4</td>
<td>p.f + P(_{100})</td>
<td>77,2</td>
<td>25,1</td>
<td>50,4</td>
<td>27,4</td>
</tr>
<tr>
<td>5</td>
<td>p.f + P(_{150})</td>
<td>75,5</td>
<td>23,2</td>
<td>48,3</td>
<td>24,0</td>
</tr>
<tr>
<td>6</td>
<td>p.f + P(_{200})</td>
<td>73,7</td>
<td>22,2</td>
<td>46,5</td>
<td>22,7</td>
</tr>
</tbody>
</table>

**Genetic-1**

<table>
<thead>
<tr>
<th>No.</th>
<th>Variants</th>
<th>Height of stalks. (sm)</th>
<th>Yield of grains (mc/ha)</th>
<th>Bean</th>
<th>Grain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number</td>
<td>Weight gram</td>
</tr>
<tr>
<td>1</td>
<td>NoPoKo</td>
<td>53,0</td>
<td>16,0</td>
<td>40,8</td>
<td>15,8</td>
</tr>
<tr>
<td>2</td>
<td>N(<em>{50}) K(</em>{75})</td>
<td>55,5</td>
<td>17,6</td>
<td>46,8</td>
<td>20,8</td>
</tr>
<tr>
<td>3</td>
<td>p.f + P(_{50})</td>
<td>58,4</td>
<td>20,4</td>
<td>50,7</td>
<td>23,8</td>
</tr>
<tr>
<td>4</td>
<td>p.f + P(_{100})</td>
<td>63,1</td>
<td>23,6</td>
<td>58,2</td>
<td>30,1</td>
</tr>
<tr>
<td>5</td>
<td>p.f + P(_{150})</td>
<td>60,2</td>
<td>22,0</td>
<td>51,8</td>
<td>23,1</td>
</tr>
<tr>
<td>6</td>
<td>p.f + P(_{200})</td>
<td>58,8</td>
<td>19,7</td>
<td>46,2</td>
<td>16,3</td>
</tr>
<tr>
<td>7</td>
<td>HCP(_{05})</td>
<td>0,84</td>
<td>0,84</td>
<td>1,24</td>
<td>0,69</td>
</tr>
<tr>
<td>8</td>
<td>HCP(_{05%})</td>
<td>1,3</td>
<td>4,0</td>
<td>2,7</td>
<td>3,2</td>
</tr>
</tbody>
</table>

The height of stalks of the “Genetic-1” sort of soya made up 53,0 sm on the control, on the preceding fertilization - 55,5 sm and on the applying 100 kg phosphorus on the preceding fertilization of NK addition made up 10,1 sm in the relation to the control. The number of branches fluctuated in the range of 1,3-2,1 on the “Genetic-1” sort and 1,6-2,6 on the sort of “Orzu”. The greatest indicators were on the optimum variant. The grain yield depends on the quantity of beans and grains, and also from their weight.
The formation and development of beans and seeds mainly is the peculiarity of the sorts, but the usage of cultivation technologies influence to the development of beans and seeds. The number of beans of the sort “Orzu” fluctuated from 32,4 to 50,4 and the sort of “Genetic-1” from 40,8 to 58,2. The greatest number of beans was formed at the application of phosphorus on the preceding fertilization 50 kg of nitrogen and 75 kg of potassium. Increasing the norms of phosphorus more than 100 kg gave the diminution in the indicators. The greatest weight of the beans on the one plant is 27,4 g at the “Orzu” sort, and 30,1 at the “Genetic sort.

The beans of the sorts of soya contain 2-3 grains, but this indicator often changes. In our researches this indicator made up averagely y 1,8-1,9 at the sort “Orzu” and 1,6-1,8 at the sort “Genetic-1”. The studying methods don’t influence to this indicator.

The number of seeds of one plant of the sort “Orzu” fluctuated from 61,9 to 90,3; of the sort “Genetic-1” – from 65,6 to 100,8. The greatest number of seeds was observed at the applying of 100kg of phosphorus on the preceding fertilization of 50 kg nitrogen and 75 kg potassium. The other variants conceded to this indicator. From these facts, it is visible, that the greatest number of beans and seeds is observed at the sort “Genetic-1”. But the seeds of this sort are small, and the data of the weight of the seed from one pant prove it.

The weight of seeds from one plant of the sort “Orzu” made up 7,7 12,9 gram, and at the sort “Genetic-1” – 6,0-8,5 gram. Therefore the size of the grain yield of “Orzu” is more than “Genetic-1”.

On the average during the 3 years the grain yield of the sort “Orzu” has made 17, 9 mc/hectares. Application of nitrogen and potassium has increased the yield to1,8 mc/hectares, or to 10,1 %. Application of 50 kg phosphorus on the preceding fertilization increased the yield to 28,4 % comparatively with the control, application of 100 kg phosphorus increased the yield to 40,2 %. The further increasing the norms of phosphorus decreased the yield of grain. The yield of the sort “Genetic-1” on the average for 2 years the grain yield on the control has made 16,0mc/hectares. Application of nitrogen and potassium has increased the yield to 1,6 mc/hectares, or to 10,0 %. Application of 50 kg phosphorus on the preceding fertilization increased the yield to 27,5 %, comparatively with the control, application of 100 kg phosphorus increased the yield to 47,5 %. The further increasing the norms of phosphorus decreased the yield of grain to 19,7 mc/hectares.

The soya differs from other pulse crops with its high maintenance of proteins and oil. The proteins and oil maintenance can be feature of the sorts, but growing methods influence to the proteins and oil maintenance. (Lupashku and Kryshmar, 1982)

Researches indicate, that application of mineral fertilizers influenced to the proteins and oil maintenance. The proteins and oil maintenance of “Orzu” made up 33,6 % on the control. Indicate increased to 3,2 % on application of nitrogen and potassium. The greatest quantity of protein – 36,8 %, was observed on the applying 100 kg of phosphorus on the preceding fertilization of 50 kg nitrogen and 75 kg potassium, that over the control to 21,1 %. The increasing of phosphorus to 200 kg decreases the maintenance of protein. The oil maintenance is 20, 47 % on the control. Application 50 kg of nitrogen, 75 kg potassium and 100 kg of phosphorus decrease some oil. But increasing the norms of phosphorus to 150 and 200 kg increased the oil maintenance to 20, 34-20, 81 %. It corresponds to soya’s biology, it is known, that on the increasing the maintenance of protein, the fat maintenance decreases. But optimum norms of mineral fertilizers increase the protein and oil maintenance.

Conclusions
1. The application of mineral fertilizers essential influenced to the growth of plants of the sorts of soya. The greatest height of stalks was observed on the applying of 100 kg phosphorus on the preceding fertilization of the 50 kg nitrogen and 75 kg potassium. At these norms of fertilizers, the height of stalks of the soya sort “Orzu” has increased to 12,8 sm, the soya sort “Genetic-1” has increased to 10,0 sm.
2. On the applying optimum norms of mineral fertilizers, the greatest number of beans on the sorts made up 50, 4-58,2, accordingly their weight increased to 27,4-30,1.
3. The greatest number of grains and their weight on the applying the optimum norms of mineral fertilizers on the sort are 90, 3-100, 8 and accordingly 12,9 and 8,5 gram.
4. Applying the mineral fertilizers influenced to the size of yield. At the after reap sowing the yield of the sort “Orzu” formed 25,1, and the sort “Genetic-1” formed 23,6 mc/ha in the optimum variant of mineral fertilizers.
5. Optimum norms of mineral fertilizers provided protein formation in the grain 36, 8 %, and oil – to of 20, 81 %.
References