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LABORATORY AND FIELD GERMINATION OF CHICKPEA SEEDS

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Abstract. This paper highlights chosen varieties of pea for the purpose of planting it in cultivated lands as well as its effective growth in the laboratory and in land. Besides, we made an experiment on the issue of its tolerance to drought land and some diseases.

Аннотация. Мақолада суғориладиган ерлар шароитида экиш учун танлаб олинган нўхат навлари донининг лаборатория ва дала унувчанлиги ўрганилган. Унда уруғларнинг униб чиқиш даражаси ўзаро таққосланган.

Аннотация. В статье исследуется лабораторная и полевая всхожесть зерна сортов гороха, отобранных для посева на орошаемых землях. В нём сравнивается всхожесть семян.

Key words: introduction, selection, harvest, biologic, morndogic, temperature, growth, ohase, replanting.

Калит сўзлар: интродукция, кўш қатор, ҳосилдорлик, биологик, морфологик, аскохитоз, харорат, унувчанлик, фаза, қайтариқлик.

Ключевые слова: интродукция, двойная серия, продуктивность, биологический, морфологический, аскоцитоз, температура, забывчивость, фаза, обратимость.

Strengthening the independence of our republic, enhancing its economic potential, and advancing it into the ranks of highly developed countries depends, among other things, on the efficient use of existing land resources, preservation and improvement of soil fertility, and its restoration.

In many countries where chickpeas are cultivated, it is customary to sow them in spring. For this reason, in drought-prone years, chickpea yields are often very low. In recent years, scientific research has been conducted on developing agrotechnologies for sowing chickpeas in late autumn, winter, and early spring. Preliminary results have shown that sowing chickpeas in winter or autumn can lead to 50–100% higher yield profitability [1].

Autumn-sown chickpea varieties showed a vegetative growth period that was 10–17 days shorter than those sown in spring. Studies on introduced varieties showed that, compared to the control variety, those sown in autumn ripened 3–9 days earlier, while those sown in spring were 7–12 days later in maturing. Sowing time influences plant development, and it was found that chickpeas sown in a 60×10×1 spacing scheme in autumn grew well and reached greater height [2].

In Z.K. Yuldasheva's experiments conducted on irrigated lands in Tashkent region, chickpea varieties were studied using various sowing rates based on different sowing periods. According to her data, when spring sowing was done with a row spacing of 60 cm (and 15 cm between rows in double-line planting) and 100 kg of seeds per hectare, yields reached 29.2

centners/ha for the Uzbekistan-32 variety and 23.1 centners/ha for the Yulduz variety. When these varieties were sown in autumn, they yielded 37.9 and 32.9 centners/ha respectively [3].

According to Z. Bobomurodov [4], when chickpeas are sown in autumn, they produce more yield components compared to spring sowing.

In recent years, the development of chickpea sowing technologies for late autumn and winter has gained significant momentum in Uzbekistan. Research on chickpea pre-winter sowing has also been carried out in various parts of the world.

M.G. Saxena [5] reported that in Syrian soil-climatic conditions, chickpeas were affected by fungal diseases such as *Ascochyta robici* and *Fusarium rasiectum*. When irrigated, chickpea yields increased by 73%, and yields from pre-winter sowing were 65% higher compared to spring sowing.

When determining sowing dates and spacing, factors such as the morphological and biological characteristics of chickpea varieties, soil-climatic conditions, moisture availability, and other environmental aspects must be taken into account.

Under Uzbekistan's conditions, chickpeas are sown both in spring and autumn. According to data from the Institute of Crop Science, early spring sowing (February–March) on rainfed lands yields high efficiency. In years with high precipitation, chickpeas sown early are more susceptible to ascochyta blight. Chickpeas are generally sown in wide rows, with a recommended spacing of 60×6–1 cm and a seed rate of 80–100 kg/ha.

Chickpeas are early spring crops, and their seeds begin to germinate when the soil temperature at sowing depth reaches +3 to +4°C. Typically, in foothill regions, this period corresponds to the beginning of March. Occasionally, air temperatures may drop below 0°C. However, such low temperatures are not dangerous for young chickpea seedlings, as chickpeas can tolerate cold down to –8°C. In the conditions of the test region, such low temperatures were almost never observed during this period.

If chickpeas are sown late, their growth and development slow down, leading to fewer pods, an increase in empty pods, and overall reduced yield. Among the local population, March is generally considered the sowing period for chickpeas.

The germination rate of chickpea varieties also depends on the sowing rate. Higher seed rates led to faster germination, while lower seed rates resulted in relatively slower germination.

In late autumn sowing, due to insufficient soil temperature, the chickpea seeds absorbed moisture and swelled without immediate germination. They only began to sprout in early spring when the soil received sufficient warmth. Seeds that ended up near the soil surface during sowing sometimes sprouted during winter, and those seedlings were often damaged by frost, while some seed embryos perished. Therefore, in the autumn sowing variant, more sparse plant stands were observed in both varieties.

In years with high precipitation, a decrease in soil temperature occurs, which slows down the germination rate of chickpea seeds during winter. However, by early spring, full seedling emergence is observed. Therefore, in years with abundant rainfall, it is recommended to slightly increase the chickpea seeding rate.

It is well known that one of the key agrotechnological measures for achieving high yield and producing quality chickpea seeds is timely and properly calibrated sowing, which ensures healthy seedling emergence. The growth, development, winter hardiness, and other yield-affecting factors in autumn-sown chickpeas are significantly influenced by the sowing time [6].

In every region, chickpea sowing in autumn should be carried out within optimal timeframes based on local soil and climatic conditions. Ensuring uniform germination and

successful entry into the winter dormancy stage — along with proper overwintering — directly contributes to higher yield potential. If chickpeas are sown too early in the autumn, the warm air and soil moisture may cause premature germination, leading to seedling damage from winter and early spring frosts. Conversely, when chickpeas are sown too late in autumn, seeds often swell but do not germinate until spring. However, if sowing is delayed excessively — particularly into winter — there is a risk that the seeds will not germinate at all [7].

Therefore, it is important to choose a sowing time that allows chickpea seeds to enter the dormancy phase after swelling, right before germination begins.

Before evaluating the field germination potential of chickpea varieties, their laboratory germination rates were tested. Two varieties — Yulduz and Obod — were studied in a thermostat using Petri dishes under laboratory conditions. The germination rate and viability were determined using four replicates of 50 seeds each, in accordance with GOST 12037 standards.

According to GOST 12038-84, under laboratory conditions, the germination rate of chickpea seeds was determined on the 3rd day after sowing, while full laboratory viability was assessed on the 7th day.

Table 1**Germination rate and laboratory germination of chickpea varieties**

№	Variety	Weight of one thousand seeds, g	Germination rate, %	Laboratory fertility, %
1	Юлдуз	312,2	78,2	95,6
2	Обод	294,7	82,1	98,1

According to the obtained data, the germination energy was higher in the Obod variety, reaching 82.1%, while in the Yulduz variety, it was 78.2%. Thus, the germination energy of chickpea seeds in the Obod variety exceeded that of the Yulduz variety by up to 3.9%.

Determining seed viability both in field and laboratory conditions is of great importance when studying plant growth, development, and productivity. When laboratory viability was examined for the two chickpea varieties, the results showed closely related values: 95.6% in the Yulduz variety and 98.1% in the Obod variety. The difference in laboratory viability between the varieties was minimal, amounting to only 2.5%.

Based on the laboratory analyses, it can be concluded that the high germination energy and laboratory viability of the Obod and Yulduz chickpea varieties suggest that further field experiments with these varieties are likely to yield promising results.

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