IDENTIFICATION OF DROUGHT-TOLERANT CROPS FOR SHORT-TERM CROP ROTATION SYSTEMS

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Abstract. *The correct selection of drought-resistant peas, barley, safflower, flax, triticale and other crops in short-term crop rotation systems in the farms of Kamashi district, Kashkadarya region, in the southern region of Uzbekistan, and the production of high-quality, abundant crops from them is of great importance. These crops are fast maturing, highly adaptable to unfavorable soil and climate conditions, absorb 60-70 percent of total water consumption due to autumn-winter natural precipitation, and provide up to 300-350 ts/ha of blue mass feed as an intermediate crop even in the years when the summer season is hot and dry.*

Keywords: *UN, FAO, food, arid, region, plant, sustainability, farm, crop species, pea, barley, safflower, flax, triticale, crop.*

Introduction. In order to provide scientific and practical support to the farms of our republic Food and Agriculture Organization of the United Nations (FAO) in cooperation with a group of scientists of Tashkent State Agrarian University within the framework of the international project for short-term crop rotation systems carried out scientific work, paying attention to the issues of identifying drought-resistant crops in the fields of farmers of the model farm "Navroz" of Qamashi district of Kashkadarya region.

The need to alternately plant agricultural crops in farming has been known for a long time. The more the same crop is planted in the same area, the more the impact of diseases and pests is serious. Multi-field crop rotation systems (sequential and intercropping of crops) have potential advantages over monoculture in terms of resource conservation and better efficiency. Farmers of the model farm "Navroz" are mainly engaged in planting winter wheat and barley, flax, sorghum and peas. Some fields are left empty or not planted due to a clean plow. This can lead to wind erosion and as a result it become a major cause of reduced soil fertility.

Growing spring crops is not given much importance in dryland areas, because there is little and unstable rainfall during the growing season, and soil fertility is considered low. Current farming systems are based on the cultivation of winter cereals. In the local and international literature, the effect of the two-field rotation system, which includes crops such as winter wheat (Triticum aestivum), peas (Cicer arietinum), field peas (Pisum sativum), flax (Linum usitatissimum), mahsar (Carthamus tinctorius), on the crop yield and economic efficiency has been studied.

Autumn Barley (Hordeum vulgare L.)

Barley (Hordeum vulgare L.) is one of the main cereal crops. It is one of the first cultivated cereal crops and is still cultivated on a large scale. Barley ear differs in structure and growth. In six-rowed barley, each node of the ear produces three kernels, while in the two-rowed type, each node produces only one kernel.

Barley is also classified by its susceptibility to cold temperatures. Winter barley should be sown in such a way that the germination of the sprouts coincides with the frost, which will allow

later spikes and grains to form in moderation. Winter barley is usually planted in the fall to be exposed to low winter temperatures, and then development is completed in the spring and summer months of the following year. Spring barley does not require cold winter temperatures and can be planted in spring. Autumn types of barley usually mature slightly earlier than spring types.

Barley cultivation has been increasing in recent years. No-tillage barley cultivation requires farmers to understand the steps involved in direct seeding technologies while reducing production costs, as it uses more production factors such as chemical fertilizers, pesticides, and growth regulators that are highly sensitive to growth stages.

Safflower (Carthamus tinctorius)

Safflower is a plant that has good benefits for high cholesterol, heart disease, stroke, diabetes, scar prevention, and many other conditions, but there is not enough scientific evidence to support its use in this way. Safflower is a fast and upright growing fall/spring annual that resembles thistle. As day length and temperature increase, a branching central stem (also called a terminal root) emerges from the leaf tuft. The height of the main stem reaches 30–150 cm. The plant also develops a tap root that is 2 m deep. When the main stem is about 20–40 cm tall, the first lateral branches begin to develop. These lateral branches, in turn, multiply and give rise to secondary and tertiary branches.

Safflower is a heat-loving plant and grows well at a temperature of 28-35°C. It is resistant to 40°C, but there are some varieties that grow at very low temperatures. The minimum duration of the vegetation period is 150 and 70 days for spring and summer varieties, respectively. The productivity of the plant is very sensitive to the different periods of planting related to temperature and day length.

In crop rotations, safflower should not be planted after safflower or in close succession with crops such as sunflower, canola (oilseed rape) or beans, which are prone to sclerotinia (white mold) disease. Crops planted after safflower can be grown after the soil is well moistened.

Flax (Linum usitatissimum)

Flax is a flowering plant. Cultivated as a food and fiber crop in cool regions of the world. Oil type is widespread in Uzbekistan. Its oil is known as linseed oil. The word "flax" refers not only to the plant itself, but also to the unspun fiber of the flax plant. This species of plant is known only as a cultivated crop and is apparently grown from a wild species called Linum bienne or pale flax.

Flax is an alternative commercial crop, especially in dryland areas where water scarcity is common (Figure 8). Seed flax is an annual plant that grows from 45 cm to 90 cm in height. It consists of a main stem with a number of branches on top, and the branches end with flowers. The plant has a widespread root system, the depth of which reaches from 72 cm to 90 cm in coarse-grained soils. A flax flower consists of five petals and a five-parted box or capsule and produces up to 10 seeds. In most cases, six to eight seeds per capsule is the norm. Flax is generally self-pollinating, but insects aid in its natural pollination. Most commercial varieties of flax have blue leaves. They can also be white or purple, blue or pink. The seeds can be of different colors: yellow, brown, green-yellow, green-brown or almost black. The seed color of most commercial varieties is light brown.

Table 1

Organization of crop rotation system according to contours in the farm "Oltinboev yeri"

Contour number	Status of planting crops in 2021-2022	Recommended to plant in 2022-2023	Recommended to plant in 2023-2024
1-st contour	15 barley	chick-pea	triticale
2-nd contour	15 flax	barley	safflower
3-rd contour	4 wheat	safflower	barley

In Uzbekistan, flax is an annual crop planted in spring, and the growing season lasts from 80 to 120 days. Timely harvesting is important in flax cultivation. Early harvesting reduces yield, while late harvesting can alter the chemical composition of the oil and, therefore, its quality and value. Flax is a crop well adapted to crop rotation in all arid zones of Uzbekistan. After flax is grown, little residue (straw) is left on the ground and this can increase the risk of soil loss due to wind and water erosion. In this case, it is advisable to plant cereal crops after flax in crop rotation.

The total cultivated area of the farm "Oltinboev yeri" in Gallaorol massif of "Navroz" model farm in Qamashi district of Kashkadarya region is 75 ha. The arable land area of the farm is located in 3 contour fields. For the harvest of 2022, 15 ha of barley were grown in the 1st field, 15 ha of flax in the 2nd field, and 4 ha of wheat in the 3rd field. Below, it is recommended to use short rotation schemes of grain-legume-oil crops, taking into account the soil and weather conditions of the dry land farm and the size of the land area. In the 1st field, 15 ha of peas instead of barley , in the 2nd field, 15 ha of flax instead of barley, in the 3rd field, safflower instead of 4 ha of wheat (16 kg/ha) have been recommended to be planted.

CONCLUSION. The efficiency and sustainability of crop cultivation in the farm "Oltinboev yeri" of the Navroz model farm can be increased by growing new varieties of peas, barley, safflower, and flax that are resistant to drought. Effective use of water reserves in the soil by the crops recommended above is important for sustainable crop production not only in the Navruz model farm, but also in the entire Kashkadarya region..

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