Impact of Internal Control on Varietal and Sowing Qualities of Seeds

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Abstract. The manifestation of main attributes which form the yield and oil-bearing capacity depends strongly on cultivation conditions and such attributes as height of plants, height of first inflorescence and 1000 kernels weight are characterized by high heritability. The research was conducted in Gallyaaral Experimental Station, farms of Jizzak oblast. Wheat varieties "Semrug", "Dustlik", "Durdona" sown under irrigated conditions and "Istiklol" sown under rainfed conditions were used for research. Biometric observations of plant growth and development were carried out on the crops during the growing season. It was determined that the varietal purity corresponds to the requirements of the standard, and the sown seeds can be used for further reproduction. The correlation analysis revealed a positive relationship with yield. A weak correlation was shown for Safflower varieties between yield and number of seeds in the boll (r=0.18) for oilseed flax (r=0.18). The oil content varied from 20% to 26.5 and exceeded the standard.
Keywords: agriculture, seed production, seed breeding, genetics, physiology, internal control, varietal purity, germinating capacity, preparation of sowing seeds, standardization, normative documents, specifications, production technology, certification.

1 Introduction

Internal seed control is used to improve the varietal and sowing qualities of sowing material. It serves to monitor the regulatory requirements for the cultivation of seed material. Requirements for the organisation, conduct and participation of auditors in this process are of great importance.

In the Decree of the President of the Republic of Uzbekistan PP-3683 of 27 April 2018 [1] "On measures to radically improve the seed production system in the Republic of Uzbekistan" stresses that varietal and seed control is a key factor in ensuring food security [2, 3]. Lack of proper seed storage and processing control leads to poor seed quality and reduced yields [4, 5].

Experience from countries with a well-developed seed industry shows that the process of varietal and seed quality control provides a guarantee of high seed quality [6, 7].

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Internal control is necessary to maintain the long-term sustainability and effective functioning of the production of a particular product, to motivate specialists to improve the performance of the enterprise as a whole, to monitor the results of internal control and regular reporting, and to make recommendations to optimise the elimination of detected deficiencies [8, 9]. The effectiveness of the enterprise as a whole depends on the productive implementation of the internal control system [10, 11].

Internal seed control procedures should be based on the principles of regularity, i.e. they should cover all current production processes and be carried out at intervals laid down in the internal regulations of the enterprise [12-14].

These procedures can be used to assess the effectiveness of the management system and serve as a basis for management decisions by interested users [15].

It should be noted that the internal control system includes actions to prevent the release of defects and to detect and correct errors in detected irregularities. The purpose of internal control is to minimise uncertainty and risks in the activities of an economic entity [16].

Seed development programmes should consider that the expression of the main traits that form yields and oil yields are highly dependent on cultivation conditions, with traits such as plant height, first inflorescence height and 1000 grain weight being highly heritable [17].

The traits of growing season duration, number of seeds in the boll and plant height have a low correlation with oilseed flax seed yield [18-19].

The advantage of oilseed flax varieties in terms of yield was achieved due to the higher weight of 1000 seeds, number of seeds in the boll and number of bolls per plant [20].

Seed quality is a complex set of its genetic (varietal), physical, physiological and biochemical properties determining the value of a seed lot for specific purposes [21-22].

Seeds of any crop are the source material for cultivation and harvesting, the value and quality of which are determined by hereditary economic and biological properties of varieties under the influence of natural, biological, organizational and technological factors [23].

2 Materials and methods

The research was conducted in Gallyaaral Experimental Station, farms of Jizzak region.

When carrying out laboratory and field studies the current standards and methods were used. State standard GOST 12036-2011 Seeds of agricultural crops. Methods of determination of quality [24], O'zDSt 2823:2014 "Seeds of agricultural crops variety and sowing quality. Technical conditions" [25].

In Jizzak oblast Pakhtakor district in farm "Zhavlonbek", in farm "Toshtemir ota" of Zafarabod district research on wheat crops was conducted where spatial isolation was studied and experiments on development of normative documents for inspection control and training of inspectors on internal seed control was carried out.

At the Gallyaaral Experimental Station of the Scientific Research Institute of Grain and Leguminous Crops, experiments were conducted under rainfed conditions on oilseed crops.

In order to analyze the yield and varietal properties of winter wheat seeds, field experiments were laid, during which the yield and other biometric indicators were investigated.

Winter wheat varieties of super elite, elite, first and second reproductions were used for the research. Experiments were laid in Galyaaral experimental station and farms of Jizzak region.

Wheat varieties "Semrug", "Dustlik", "Durdona" sown under irrigated conditions and "Istiklol" sown under rainfed conditions were used for research. Biometric observations of plant growth and development were carried out during the growing season and the data obtained are shown in Table 1.

Table 1. Biometric observations on winter wheat crops in Jizzak oblast in 2020-2021

№	Variety	Reproduction	Growing season	Spike length cm	Number of grains per ear	Grain weight in the colossus	Number of spikelets	Weight of the 1st colossus	Plant height cm	Weight of 1000 seeds g	Yield, kg/ha
Gallyaaral Experimental Station											
1	Semurg	C-elite	227	9.28	47.8	2.21	21.2	3.61	113.6	42.4	44.6
2	Semurg	elite	229	9.17	46.9	2.17	20.8	3.58	112.8	41.9	43.9
3	Semurg	R-1	230	9.17	46.8	2.13	20.5	3.54	112.6	41.9	43.7
4	Istoqlol	C-elite	240	8.24	41.0	1.93	18.4	3.13	101.4	37.8	25.4
5	Istoqlol	elite	243	8.13	40.7	1.90	18.1	3.09	100.9	36.2	24.3
6	Istoqlol	R-1.	244	8.10	40.5	1.90	17.9	3.10	100.5	36.0	24.0
Zhavlonbek farm											
7	Dustlik	elite	232	10.12	44.4	2.18	20.9	3.57	115.7	41.9	50.3
8	Dustlik	R-1	235	9.94	43.7	2.17	20.7	3.54	114.4	40.5	48.7
“Toshtemirota" farmstead											
9	Durdona	elite	237	9.41	45.6	2.20	21.0	3.59	112.6	40.3	48.1
10	Durdona	R-2	238	9.37	45.2	2.17	20.6	3.55	111.5	39.9	46.7

3 Results and discussion

The yields obtained ranged from 24 centners/ha in variety "Istiklol" R-1 to 50.3 centners/ha in variety "Dustlik" elite. Yield variation by reproduction was 43.7 to 44.6 centners/ha in the variety "Semrug", which was 0.9 centners/ha higher in the super elite than in the R-1 variety. For the variety 'Dustlik', the difference was 1, 6 c/ha between elite and R-1. The difference between elite and R-2 in the variety 'Durdona' was 1.4 centners/ha in favour of elite. The lowest yield was obtained for the variety 'Istiklol' and was between 24 R-1 and 25.4 cwt/ha for the super elite. The data shows that the yield depends to an insignificant extent on seed reproduction.

The growing season was 244 days for the Istiklol variety R-1. The lowest vegetation period was 227 days for the variety "Semrug" super elite, which is 3 days less than R-1.

The ear length of 10.12 cm was found in variety "Dustlik" elite, which is 2.02 cm higher than in variety "Istiklol" R-1. The spike length varied insignificantly between the reproductions. The weight of seeds in one ear ranged from 1.9 g in the variety 'Istiklol' R-1 to 2.21 g in the variety 'Semrug' super elite, while the weight of one ear of the same varieties varied from 3.1 g to 3.61 g.

The best indicator of the mass of 1000 pieces of seeds was in the variety "Semrug" super elite 2.4 grams, which exceeded the mass of R-1 by 0.6 g, in the variety "Dustlik elite mass of 1000 pieces of seeds exceeded the mass of R-1 by 1.4 g.

The difference in the growth of plants by variety Semrug was at the level of 0.8 cm to one cm, which does not exceed the error of the experiment.

The results obtained by analyzing the work of seed production organization of winter wheat varieties showed the possibility of obtaining high yields of grain and sowing seeds regardless of the reproduction sown. It has been determined, that variety purity corresponds to standard requirements, and sown seeds can be used for further reproduction.

Meeting the needs of the population of the republic in oilseeds production by increasing sown areas, their yields and quality is urgent.

At present, 70-80 thousand hectares in Uzbekistan are under oil-bearing crops in rainfed areas. The average seed yield is 10-12 cwt/ha on rainfed area and 19-22 cwt/ha on irrigated area.

The varieties of safflower and flax in the Laboratory of Oilseeds Breeding and Seed Production of the Gallaaral Research and Experimental Station were involved in our research. Table 2.

Table 2. Variability of yield structure elements, physiological traits of safflower varieties depending on the variety under rainfed conditions

№	Variety	Total water content of leaves %	Coagulation temperature of water-soluble proteins, C^0	Number of seeds in a basket, pcs.	Weight 1000 grains grains, g	Yield-yield c/ha	Mass % of the populati on
1	Milutin-114	79,19	62,7	30,0	32,3	5,2	20,8
2	Gallaorol, st	76,95	63,5	33,0	34,9	5,4	21,0
3	Jizzakh-1	76,66	64,0	34,0	34,4	6,6	22,6
4	2018/2	75,94	63,2	38,0	34,4	5,4	24,8

5	2018/4	76,69	65,0	33,0	32,2	6,4	25,3
6	2018/6	75,87	64,2	34,0	34,0	6,3	25,9
7	2018/от	74,25	65,0	35,0	34,7	6,1	26,5
8	2018/8	75,19	65,0	33,0	33,9	5,2	24,5
9	2018/10	83,33	65,5	39,0	34,3	6,0	25,5
10	2018/2	82,26	65,0	35,0	33,8	5,4	23,3

Table 2 shows that the coagulation temperature of water-soluble proteins in safflower leaves was 63.2 oC (2018/6) to 65.5 oC (2018/4), the standard was 63.5 oC; the weight of 1000 grains was 32.2 g. (2018/4) to 34.4 g. (Gizzakh-1, 2018/2), with the standard 34.9 g; oil content - 20.8 % (Milyutin-114) to 26.5 % (2018/o), with the standard 21.0 % (Gallaorol).

Table 3. Variability in elements of yield structure, total crude biomass of KCI oilseed flax varieties

D	Variety	Number of seeds per box, pcs.	Weight 1000 grains grains, g	Yields, cwt/ha	Oil content, %	Total crude biomass of 10 plants, g
1	Bahmal, st	8	4,4	6,4	38,8	111,3
2	2018/от	9	4,6	6,8	39,1	119,9
3	2018/4	10	4,6	7,0	38,6	96,8
4	2018/5	9	4,5	6,8	37,7	128,3
5	2018/6	10	4,5	6,4	37,9	111,1
6	Bahorikor	10	4,8	7,8	40,8	138,9
7	2018/7	10	4,6	6,5	37,2	120,3
8	2018/8/an.	9	4,9	7,7	39,8	139,4

Tabulated data show that the weight of 1,000 oilseed flax grains was between 4.5 g. (2018/5, 2018/6) to 4.9 g. (2018/8/an.), in the standard 4.4 g; oil content from 37.7 % (2018/5) to 40.8 % (Bahoricor), in the standard 38.8 %; total crude biomass from 96.8 g. (2018/4) to 139.4 g. (2018/8/an.), in the standard 111.3 g, (Bakhmal-2).

High positive correlation coefficients for coagulation temperature of water-soluble proteins in leaves in safflower varieties, for oiliness in safflower and oilseed flax varieties with yield were observed according to the results of the study. The correlation between the yield of safflower and the number of seeds in the pod and the total crude biomass was very weak in safflower cultivars and in oilseed cultivars between the yield and the number of seeds in the pod and the total crude biomass.

4 Conclusions

The internal control of analysis of organization of winter wheat varieties seed production has shown the possibility of obtaining high yields of grain and sowing seeds regardless of the

reproduction sown. It has been determined, that the varietal purity corresponds to the requirements of the standard, and sown seeds may be used for further reproduction.

The interrelation between elements of yield structure and physiological indices of safflower and oilseed flax has been established. As a result of the correlation analysis the positive interrelation with the yield is drowned. The weak interrelation was shown in safflower varieties between the yield and number of seeds in the boll (r=0.18) and in oilseed flax (r=0.18). The oil content varied from 20% to 26.5 and exceeded the standard.

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