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RESEARCH ARTICLE

BIOMETRIC INDICATORS AND YIELD DURUM WHEAT GRAIN

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ABSTRACT

Dry, hot climate of our republic together with high value of photosynthetic radiation provide the high maintenance of fibers and gluten in grains of firm sorts of wheat and in the whole their high quality. Firm sorts of wheat in comparison with soft sorts more a rack to shallowness, to heats, are less subject to a yellow, brown rust and smut, the ripened ears do not lose some grain. Besides, for the purpose of maintenance of the population with food production on the firm sorts of wheat liberated from a sowing the areas it is possible to cultivate green gram, millet, soya and other cultures, and for increase of fertility of soil – anindi gopherplant as green weight. Cultivation of these cultures, besides other, gives high economic benefit.

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INTRODUCTION

Methods of biochemistry have great practical importance for medicine, agriculture, sphere of industry processing vegetable raw materials (Kazakov, 1989). Biochemistry provides the knowledge needed to solve problems of management of development of plant organisms, study of the laws and regulation of the synthesis of substances in plants, the creation of new forms of organisms, breeding of new grades (Gastyukhin and Egorov, 2001). The protein content in wheat varies widely - from 9.2 to 25.8% (on the average 13.5%). During pot experiments receive wheat grain with more protein. Durum wheat grain contains protein more than a grain of soft wheat (Dariboyev Yu, 2001; V. Zerno's oaks of intensive technologies, 2002; Anisimov *et al*., 1986; Kretovich, 1986). Objective - aims to study the biometric parameters and yield of durum wheat of local regions of the Republic of Uzbekistan. The basic quality parameters, physical and chemical characteristics of cereals have been researched. The course of the study. Experimental studies have established that the rate of vitreous labile, it is more amenable to the influence of various external factors than protein content. For certain tissues wheat protein substances are distributed unevenly (Table 1).

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The most rich in protein substances are in aleurone layer. A lot of proteins are in the bud. The protein content in the endosperm is less than in a whole grain. Thus sub aleurone layer of hard red wheat contains 45% of protein and 11% inner. Wheat - the most important food culture, because it contains gluten, bake out bread with a high nutritional value, pleasant taste, with a porous, resilient and elastic crumb. When mixing wheat flour with water, proteins absorbs water and swell, slips into the mass of dough. Gluten - a major factor of baking of wheat flour. It affects the gas-retaining ability of the dough, and therefore, the volume and porosity of the bread. Strong gluten in the normal flour makes dough too stiff, barely stretchable carbon dioxide. Weak dough holds carbon dioxide not so good, as its weak gluten can't create in the dough the protein framework of necessary strength. The strong gluten during fermentation is more firmly maintains its inherent physical properties.

Conducting analysis revealed that the composition of the gluten under studied grades of wheat ("Istiklol") besides protein includes other agents (Table 2).

Yield and its quality are determined by the relation of action and a set of external and internal factors. The external factors include climate, soil composition, and a set of technical measures, the internal factors - natural features of cereals, what is their biological nature, their hereditary characteristics. The set of internal factors responsible for investigating signs of

organisms called genotype - a collection of all the genes that determine the development of the characters and properties of plants. Complex of all the signs and properties of the plant, formed on the basis of genotype in the development process in terms of interaction with the external environment, called the phenotype. The relationship with the environment - an obligatory condition for the existence of cereals, like all living organisms. Under the environment we consider a combination of factors, wind, as well as animals, plants and humans. Long-term weather regime, which is observed in the area, i.e., totality and the sequence change of weather is called climate. The climate and the soil – are the main natural conditions, which grows and develops cereals. Wheat can germinate at a temperature of 1 ... 20 C.

The geographical factor (Fig. 1) affects the timing of maturation of the grain of different cultures, cultured in the same climate zone. The use of mineral fertilizers - one of the leading elements of intensive agriculture - have a great impact not only on soil fertility and productivity, but also on biochemical properties and grain quality. On average in the major grain-producing areas of Uzbekistan yield increase (Fig. 2) of grain as a result of mineral fertilizers (nitrogen, phosphate and potash) made (centner / hectare): 6.7 winter wheat; spring wheat 4.5. Chemical fertilizers can dramatically change the chemical composition of the grain. Appropriate selection of doses of fertilizers, taking into consideration the chemical composition of the soil along with the rise of productivity, leads to a significant improvement in the quality and technological advantages of wheat.

Table 1. The protein content (average data) in different parts of morphological grades of wheat, % of dry matter

Title	Grade «Alexandrovka»		Grade «Istiqlol»	
	In each of the parts of the grain	The ratio of parts of the grain	In each of the parts of the grain	The ratio of parts of the grain
Whole grain	16,07	100	11,4	100,00
Endosperm	12,91	65	9,3	76,90
Aleurone layer	53,16	22	18,0	12,60
Bud shield	37,63	8	30,5	3,05
			24,0	3,60
Pericarp shell			2,8	1,60
	10,56	5	9,7	2,25

Table 2. The chemical composition of the gluten of wheat grades "Istiqlol" (% Dry matter)

Protein substances				Lipids			Carbohydrates				
Gliadin	Glutenin	Albumin and globulin	Total	Free	Related	Total	Starch	Sugar	Cellulose	Total	Ash content
39,09	35,07	6,75	80,91	4,20	-	4,20	9,44	-	2,02	11,46	2,48
-	-	-	72,67	0,75	6,30	7,05	-	-	-	18,82	0,63
-	-	-	82,60	0,12	8,38	8,50	8,79	-	-	8,79	0,71
50,20	34,85	3,35	88,40	2,12	-	2,12	6,72	1,20	-	7,92	0,92
43,02	39,10	4,41	86,53	2,80	-	2,80	6,45	2,13	-	8,58	2,00
-	-	-	90,00	-	8,00	8,00	0,01	-	-	0,01	0,50
-	73,7	5,3	79,0	2,91	4,19	7,10	7,28	1,20	1,08	9,56	2,80
Average											
43,5	36,0	4,0	83,5	1,0	6,0	7,0	6,0	1,3	1,3	8,6	0,9

Table 3. Effect of irrigation on the yield of wheat grain and protein yield

Title	Grade «Alexandrovka»		Grade «Istiqlol»	
	Irrigated	Non-irrigated	Irrigated	Non-irrigated
The weight of grains 1000gr.	36,1	20,1	30,9	18,8
The number of grains per ear	22,3	11,0	27,1	23,6
Grain yield, (centner / hectare)	18,2	2,2	28,0	7,9
The protein in the grain, %	15,7	17,4	14,6	18,1
The yield of protein per 1000 grains, gr.	5,7	3,5	4,5	3,4
The yield of protein per 1 ha, kg.	287	38	409	143
Same as in irrigated%	100	13	100	39
Soil Moisture,%	30	40	60	70
The weight of 1000 grains of wheat, gr.	23,0	24,7	26,4	28,4
Nitrogen,%	2,68	3,0	2,60	1,84

Table 4. Effect of irrigation on the chemical composition and quality of wheat grades "Istiqlol"

Title	Protein, %		Fiber, %		Starch, %	
	Non-irrigated	Irrigated	Non-irrigated	Irrigated	Non-irrigated	Irrigated
Soft spring	17,33	15,16	2,12	1,81	62,5	67,7
Winter soft	20,06	14,76	2,68	2,08	62,7	72,0

Table 5. The effect of irrigation methods on the quality of the wheat grain "Istiqlol"

Title	the average yield of 2 g, centner / hectare	Nature, g/l	Vitreous%	Crude gluten, %	Protein, %
Without irrigation	29,6	784	94	33,2	16,5
Moisturizing	45,4	813	90	30,	15,1
Sprinkling	59,9	813	83	28,2	14,0
Watering the bands	61,3	816	86	29,4	14,7
Furrow irrigation	58,5	815	86	29,5	14,7

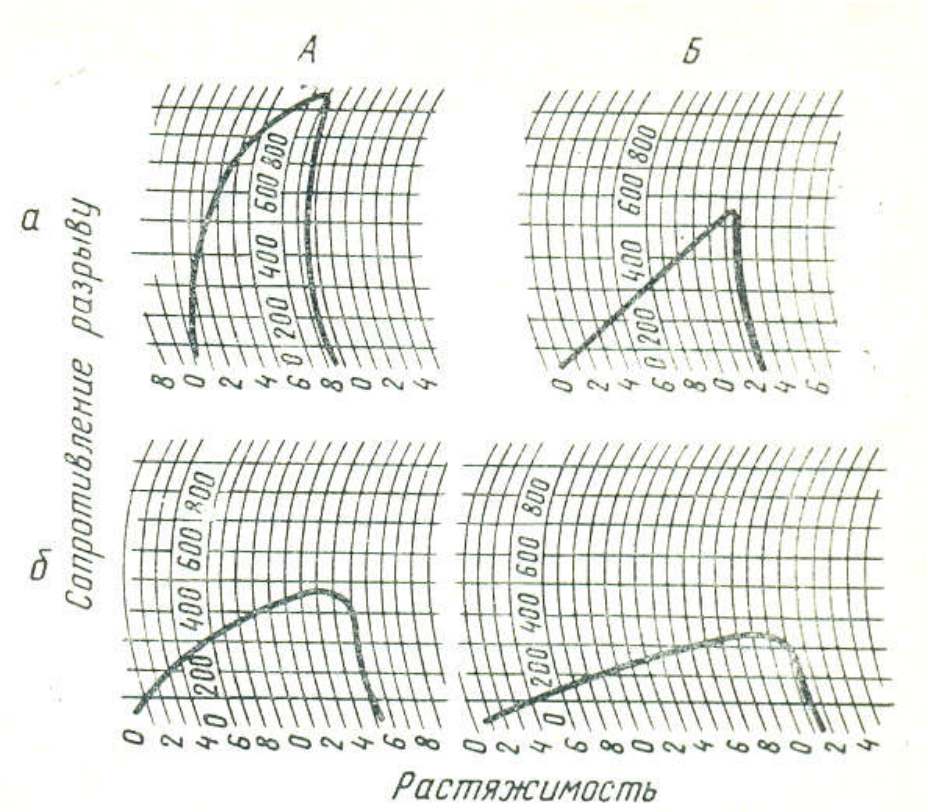

Fig.1. Glyutogramma of two varieties of wheat grown in different conditions

A - wheat is grown in the hot, dry climate of Uzbekistan at the lack of nitrogen in the soil;
B - wheat grown in irrigated lands in conditions at moderate temperatures in fairly moist soil, nitrogen fertilizers; a- grade "Alexandrovka"; b-grade "Istiqlol"

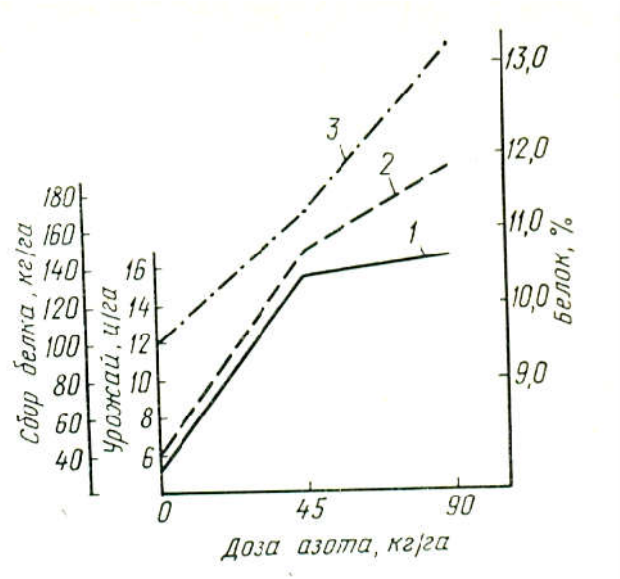

Fig.2. Effect of nitrogen fertilizer on the grain yield (1) of winter wheat, protein content in it (3), the collection per hectare (2)

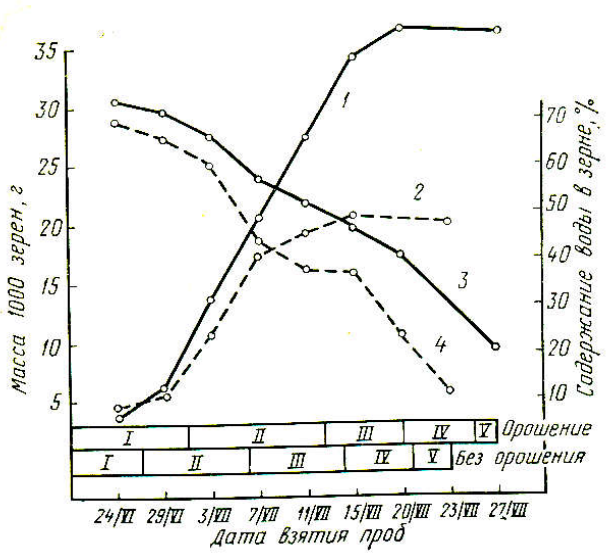

Figure 3. The accumulation of dry matter and the water content in the grain development of irrigated and rainfed wheat, the weight of 1000 grains

1-Irrigated; 2-Without irrigation, the water content in the grain; 3-Irrigated; 4 without irrigation. Phases of development of grain: I-formation of grain; II-lactic ripeness; III-doughy maturity; IV-wax ripeness; V-full ripeness. Under the influence of irrigation reduced the protein content in the grain and other cereals.

Adding only phosphorus and phosphorus-potassium fertilizer without nitrogen contributes to grain yield, but no effect or slightly reduces the content of protein. Established that nitrogen fertilizer, as long as increasing the gluten content, it effects on the quality of different depending on the grade and weather related conditions during pouring, the ripening and harvesting grain. Under conditions of high temperature and lack of water quality grain grown using fertilizer compared to the control (no fertilizer) is improved; during the maturation and harvesting in rainy year - worsening, and in some cases it remains unchanged. With prolonged use of fertilizers on acidic soil, nitrogen fertilizers reduces the amount and quality of protein, and the simultaneous use of phosphate fertilizers is not only repays the negative effect of nitrogen, but also increases the protein content and improves its quality.

Thus, in ascertaining the impact of the external environment on the quality of protein and gluten at the beginning its necessary to consider the weather a period of grain filling and ripening. Irrigation - one of the ways to obtain stable yields of grain, regardless of weather conditions. In dry areas irrigation increases yields 5 ... 6 times and more (Figure 3). However, an increase in the absolute yield increase of protein per unit area leads to a relative decrease in grain protein content (Table 3). Reducing the amount of protein in wheat at reflux (Table 4) may be significant. On the qualitative characteristics of grain affects irrigation methods (Table 5). Irrigation increased the weight of the grain, but slightly lowered its glassy. During ground irrigation methods wet gluten content and the protein was the same, while sprinkling has decreased its content. By baking advantages of wheat grain grown at moisture and irrigation bands corresponding to the requirements of the excellent bread (5 points), and for sprinkling - for good (4 points). In some cases, during the sprinkling the yield a little lower than under furrow irrigation. The highest yields are usually achieved with irrigation of the bands.

Conclusion

The main factors affecting the productivity of biometrics and durum wheat are especially plant cell, a set of external and internal factors of climate and soil applied fertilizers, irrigation and farming practices used in growing corn.

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