

## Technological significance of anatomical features and chemical composition of grain

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**Abstract:** anatomic characteristics of grain, the importance of chemical composition, the amount of the main mineral substances in the grain, relative distribution of substances by anatomical parts of wheat grain

**Key words:** anatomical parts, porosity, aleiron floor, protein, gluten, enzymes, vitamins, cereal, flour weighing

The grain of wheat and cereal crops has a complex structure and the structure of its anatomical parts, and in appearance - a shape specific to each crop group.

The anatomical feature of the grain played a significant role in the formation of its technological potential, as well as in the organization and management system of the technological process in mills and grain factories. The ratio of the mass of anatomical parts determines the potential output of products during grain processing. The presence of flower husks in cereal crops requires the organization of husk separation in technological operations. In the process of milling wheat, rye, and triticale grains, the furrow that penetrates deep into the grain makes it difficult to selectively crush the starchy part of the kernel. The structure of flower shells, shells, cells of the aleurone layer has a clear significance.

The results of a large number of scientific works show that the ratio of the mass of the anatomical parts of the grain varies depending on the type of grain, its size and other factors. For example, the composition of the starchy part of the kernel in wheat grain varies by 8% - 85...75%, in rye grain - by 7% - 78...71%. Therefore, the technological potential of grain is not the same. For wheat grain, the amount of the starchy part of the kernel is on average 82.5%, the aleurone layer - 8.0%, the husk - 7.0%, and the bran - 2.5%.

Shelliness varies between 8...15% in barley, 20...40% in oats, 14...35% in rice, 16...22% in millet, and 17...25% in buckwheat.

The size of the grain has a great influence on the amount of kernel. For the large fraction of wheat grain with the residue of 2a – 28 x 20 grain, the kernel is equal to 83...85%, for the elan of 2a – 20 x 20 grain and the small fraction with the residue of 2a – 18 x 20 grain, the amount of kernel decreases to 78...80% .

As the grain size of oats and other crops decreases, the shelliness of the grain increases.

Experiments show that the amount of starch directly depends on the output of flour or groats.

Figure 1 shows the cross-section and longitudinal section of a wheat grain. According to the anatomical part, the grain is divided into three parts: the core (endosperm), the husk and the shells surrounding them - the protective layer of the grain. Each part has a complex structure and composition. Wheat, barley, rye, triticale, oat grains have a furrow on the inside, and entered the core in a special folded form.

In the production of flour and semolina, the outer layers of the grain are separated in the form of additional products - bran, feed flour, flakes, and the core of the grain is turned into a finished product. Separating the anatomical parts of the grain into such separate products is considered a complex engineering task.

**Table 1. The amount of the main mineral substances in the grain**

<b>Crop type</b>	<b>Protein</b>	<b>Starch</b>	<b>Fiber</b>	<b>Fatty</b>	<b>Acidity</b>
Wheat	10...20	60...75	2...3	2...2,5	1,5...2,2
Rye	8...14	58...66	1,8...3,2	1,7...3,2	1,7...2,3
Barley	11...15	58...68	4,5...7,2	1,9...2,6	2,7...3,1
Oatmeal	10...13	40...50	11,5...14	4,5...5,8	4,0...5,7
Triticale	11...23	49...57	2...3	3...5	1,8...2,2
Rice	8...10	65...75	9,5...12,5	1,5...2,5	4,5...6,8
Tariq	10...15	58...65	10...11	1,9...2,3	3,7...4,5
White corn	9...14	51...61	5...6,5	2,7...3,7	1,8...2,4
Corn	9...11	68...76	2,5...3	4...6	1,4...1,8
Grechikha	10...13	66...68	10...16	2,3...3,1	2,3...2,6
Peas	21...32	46...61	5...3	1,3...2,9	2,5...4,0
Shadow	30...32	2...4	4...5	15...18	4,0...5,2

These differences are clearly shown in Table 1. In the shell, there are mainly substances that cannot be digested by the human body. The aleurone layer of the pulp and core has a high protein content. They also contain a lot of fat, which reduces the shelf life of flour or cereal. Therefore, they are removed during the grinding or grinding of cereals. Starch, as the main reserve nutrient for seeds, is necessary for the development of a new plant, and it accumulates in the inner part of the kernel, which is located under the aleurone layer.

Forming the protein gluten, it is found only in the starchy part of wheat, barley, rye, and triticale grains. Shells contain a lot of pentoses, lignin, and fiber. For example, the fruit and seed coat of rye grain consists of 30% pentosans, and the amount of fiber is up to 25%.

**Table 2. Relative distribution of substances in the anatomical parts of the wheat grain, in relation to the total mass.**

Anatomical	Components	Protein	Starch	Fiber	Fats Minerals
Shells with an aleuron layer	20	0	90	30	65
Murtak	10	0	3	20	10
Starchy endosperm	70	100	7	50	25

### **Conclusion**

Substances are not evenly distributed within the nucleus. Experiments have shown that biologically valuable substances: protein, vitamins increase from the center of the grain to the edge. In particular, there are a lot of them in the subaerial and aleuron layers. But the cells of the aleurone layer do not obey enzymes in the human digestive tract, so adding the aleurone layer to its composition is considered useless. In addition, due to the high amount of fat in the flour, it has a negative effect on the preservation of the flour

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