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Research Article

Role of Varieties in the Formation of Oil-Main Raw Materials from Spring Rapeseed

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ABSTRACT

This paper discusses the yield and fat content of modern varieties and hybrids of spring rapeseed domestic and foreign breeding. A comparative analysis of yield data showed that the domestic variety Warrior and foreign hybrids are equivalent in yield. The fat content has some variations in varieties and hybrids, but the gross collection of fat is largely dependent on the yield; that is, the formation of oilseeds per unit area is largely dependent on productivity.

Keywords: spring rape, variety, hybrid, yield, fat content

INTRODUCTION

When choosing a variety for cultivation, it is necessary to take into account its genetic potential, biological features and the purpose of use [1]. The role of ecological sustainability of varieties and hybrids is especially high with low availability of technogenic means [12].

Cultivation of adaptive, high-yielding biloba varieties and spring rape hybrids is the basis for obtaining high and sustainable yields. These varieties and hybrids can significantly improve the efficiency of oilseed production without increasing the anthropogenic load [3, 5].

Scientists believe that the introduction in production of highly productive and adaptive varieties of spring rape can increase its yield by 25% [7, 14].

Many scientists believe that hybrids are the most productive; they ripen faster and are resistant to lodging. According to V.V. Karpachova creating and introducing into production of spring rape hybrids can increase these figures by another 10-15% [13]. According to S.I. In Astashina [4], the yield of hybrids is 32-49% higher, and the collection of fat is 43-65% per unit area.

Some scientists note the advantage of foreign hybrids compared to Russian varieties. So, in the experiments of E.F. Vafina [6] of productivity had a hybrid of SV Sfinto. In studies A.A. Gromova et al. [9], the yield of the Hybrido and Siesta hybrids was 0.81 and 0.45 t/ha, respectively, higher than the variety Warrior (0.98 t/ha). The siesta hybrid was more fruitful than the Warrior variety and in the research of V.A. Gulidova and T.V. Zubkov [10].

In the conditions of the south of the Central Black Earth region N.T. Pavlyuk [15] recommends cultivating hybrids Siesta and Mobile KL. In extremely dry seasons, the author proposes to cultivate hybrids of Hidalgo, Mobil KL, Salsa KL and Trapper.

However, according to N.V. Seryogina [16], it is necessary to continue exploring hybrids due to the long period of maturation compared with domestic varieties.

Thus, the introduction into the production of new varieties and hybrids of spring rape can increase the yield of both seeds and the oil content in them; increases resistance to abiotic stressful conditions, diseases and pests. However, it should be remembered that not all varieties and hybrids can be cultivated in a particular area, it is best to use zoned ones.

Therefore, the aim of the research is to compare foreign hybrids with domestic varieties in terms of yield and oil content.

RESEARCH METHODOLOGY

To solve research tasks, we conducted field experiments and laboratory studies in 2015-2017 on the basis of Perm Gatu.

The object of research was the following varieties of spring rape (Brassica napus L. ssp. OleiferaannuaMetzqer): Warrior; Smilla; Is mischievous; solar CL; Mobile KL; Salsa CL; Macro; Trapper; Caliber; Akhat; Miracle.

The repetition of the experience is threefold, and the placement of options is systematic. Accounting area plots 54 m^2.

Experiments were carried out on sod-fine-podzolic heavy loamy soil typical of the Middle Urals. The arable layer was characterized by medium cultivation.

Agrotechnology in the experiments corresponded to the scientific system of agriculture recommended for the Middle Urals [2].

The content of crude fat was determined according to GOST 13496.15-97 [8].

The significance of differences in the yield and fat content of varieties and hybrids was calculated by the method described by B.A. Dospekhov [11]. The ecological plasticity of varieties was compared by the method proposed by S.A. Eberhart and W.A. Russell [17].

RESULTS

A comparative assessment of the domestic variety Warrior and foreign hybrids of spring rapeseed on the yield of oilseeds show that they are equivalent (Table 1).

However, in 2015 and 2016 Miracle hybrid provided an increase of 0.74 and 0.92 t/ha of seeds, respectively, compared with Warrior. In 2015, the hybrids Solar KL and Akhat also surpassed the control variant in terms of crop yield by 2.0 and 1.9 times. In 2017, the yield of all studied variants did not differ from the standard. The best of foreign hybrids Smilla surpassed in productivity hybrids Ozorno, Solar KL, Mobile KL, Macro by 1.12; 1.16; 1.22 and 1.02 t/ha, respectively.

According to the data obtained, the most responsive to the improvement of weather conditions over the years of research for the studied spring rape hybrids were the varieties Akhat and Smilla. These hybrids are demanding to a high level of agricultural technology, as only in this case they will give the maximum return. In these studies, the Salsa KL, Ozorno, Mobile KL and Miracle hybrids were the least responsive to improving growing conditions.

1. Productivity and environmental plasticity varieties and hybrids of spring rape, t/ha oil seeds

Hybrid	Year			∑Yi	Yi	bi
	2015	2016	2017			
Warrior (k)	1.05	0.08	1.30	2.43	0.81	1.19
Smilla	1.39	0.39	2.15	3.93	1.31	1.47
Mischievous	1.13	0.62	1.03	2.78	0.93	0.51
Solar CL	2.10	0.44	0.99	3.53	1.18	1.27
Mobile KL	1.44	0.72	0.93	3.09	1.03	0.54
Salsa CL	0.72	0.61	1.26	2.59	0.86	0.39
Macro	1.56	0.70	1.13	3.39	1.13	0.73
Trapper	1.22	0.25	1.74	3.21	1.07	1.32
Caliber	1.26	0.26	1.47	2.99	1.00	1.20
Akhat	2.03	0.28	1.77	4.08	1.36	1.79
Miracle	1.79	1.00	1.23	4.02	1.34	0.59

∑Yj	15.69	5.35	15.00	36.04		
Yj	1.43	0.49	1.36			
Ij	0.33	-0.61	0.27			
NCP_{05}	0.74	0.66	0.94		0.66	

Thus, when selecting varieties and hybrids in a particular farm, it is necessary to focus not only on the level of yield of a breeding achievement, but also on its responsiveness to growing conditions.

On average, over three years, the advantage in fat content is observed in the hybrid Akhat, Ozorno, Macro and Trapper (table 2). These varieties in the seeds formed more than 46% fat. The variety Warrior in all the years of research was inferior to them in this indicator. In 2015, the highest fat content of 44.2% was observed in the Macro hybrid. Somewhat less fat, 42.3% in seeds accumulated the Akhat hybrid. Hybrids Mobile KL and Salsa KL were also distinguished by a large presence of fat in the seeds. The lowest-fat content in the seeds of the 2015 crop was observed for the Solar CL hybrid.

In 2016, the highest fat content was observed in the seeds of hybrids Ozorno, Solar KL and Caliber (Gains to the control were 5.6-6.6%). Somewhat lower fat content was recorded in the seeds of Smill's hybrid 41.7%, which is 0.8% more than in the variety Warrior.

2. Content and gross collection of fat varieties and hybrids of spring rape

Sort	Fat content, %				Gross collection of fat, kg/ha			
	2015 year	2016 year	2017 year	the average	2015 year	2016 year	2017 year	the average
Warrior (k)	38.5	40,9	48,9	42,8	405	32	637	358
Smilla	37.9	41,7	48,6	42,7	525	162	1045	577
Mischievous	39.3	46,9	52,5	46,2	445	291	541	426
Solar CL	36.9	46,5	50,3	44,6	773	203	497	491
Mobile KL	40.7	43,9	52,7	45,8	588	318	490	465
Salsa CL	40.0	46,1	50,3	45,5	289	281	635	402
Macro	44.2	45,4	50,1	46,2	690	317	564	524
Trapper	36.7	42,5	53,4	46,6	446	105	929	493
Caliber	37.9	47,5	48,7	44,7	477	124	717	439
Akhat	42,3	45,7	54,3	47,4	859	127	960	649
Miracle	38.7	46,5	52,9	46,0	693	465	652	604
NCP_{05}	1.3	0,4	0,3	3,4	307	304	495	302

The weather conditions of 2017 contributed to a greater accumulation of fat in them. The highest values of this indicator were observed in the Trapper and Akhat hybrids (53.4 and 54.3%, respectively, which is 4.5 and 5.4% more than in the Warrior variety). The Smilla and Caliber hybrids contained the same amount of fat in their seeds as the Warrior variety. The remaining options provided an increase in this indicator from 1.2 to 4.0%.

On average, for three years of studies on gross fat collection, the studied varieties and hybrids were comparable. At the same time, trends in increasing the gross fat collection per unit area of the Smilla, Akhat and Miracle hybrids have been revealed, however, these trends have not been proved by mathematical processing and are associated with an increased fat collection from 1 ha over the years. In 2015, the highest gross yield of fat per unit area was obtained in the variants with hybrids Solar KL and Akhat, 773 and 859 kg/ha, respectively, which is 1.9-2.1 times more than the variety Warrior. In 2016, the Miracle Hybrid had the advantage, and in 2017, Smilla had the advantage.

Thus, the production of oilseeds from varieties and hybrids of spring rape from a unit area is more dependent on the yield of seeds and less on the fat content in them.

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