

Kazakhstan. The experiments used a hybrid of the Avangard sunflower. Seeding rate recommended for zone 1 of West Kazakhstan. Tillage system adopted in the 1st zone of West Kazakhstan region.

When conducting research on the study of sunflower, nitrogen and phosphorus mineral fertilizers were used in the recommended doses for the region.

The repetition of the experiment, the size and location of plots when setting up, organization of observations of the onset of phenological phases, the counts of the growth and development of sunflower were carried out according to generally accepted methods [9]. Statistical processing of research results by the method of variance, analysis using computer programs [10].

**Results and discussion.** One of the important elements of the adaptive technology of sunflower cultivation is the system of pre-soil tillage, which is aimed at maximizing destruction of seedlings and seedlings of weeds, preserving the accumulated stock of soil moisture and creating optimal conditions for seed germination.

Experiments have shown that the studied options for the care of crops did not have a significant impact on the duration of the phases of sunflower plants development. In the years of research (2018-2020), the timing of the appearance of full seedlings for all experiment options was the same. On average for 3 years, the duration of the vegetation period from sowing to seedlings on all experiment options was 10-15 days. During the years of research, the most favorable conditions for the development of sunflower in the initial period developed in 2019. In 2018 and 2020, the growth of sunflower plants at the beginning of vegetation was influenced by the return of cold. In 2018, hot weather settled in the 1st decade of May, which had an impact on the intensity of friendly germination of sunflower plants. The growth and development of sunflower from the phase of 2 real leaves (May 24) to the end of the phase of 7-8 leaves (June 5) took place with a change in ambient temperature to 15-18 degrees and in the absence of precipitation. This factor influenced the growth processes of sunflower. Further, during all the years of research, at the beginning of anthode formation phase, favorable (up to 28-32 degrees) weather settled, accompanied by short-term precipitation. During the research years, the duration of "germination-anthode formation" period on all versions of the experiment was 38-45 days. The interfacial period of anthode-flowering took place against the background of variable temperatures with short rains. 13-18 days after anthode formation phase, the flowering phase occurred. In different years, sunflower plants from the time of sowing reached the flowering phase in 67-73 days. In 2018, the phase of sunflower flowering was noted on July 18, in 2019 on July 3, and in 2020 on July 8. The flowering phase of sunflower also took place under conditions of variable temperatures (25-32 degrees) and accompanied by atmospheric precipitation. During the growth phase of sunflower seeds (July 22), against the background of air temperature of 25-30 degrees, summer rains took place, sometimes heavy rain. During the research years (2018-2020), the total duration of sunflower vegetation period, depending on the techniques of crop care, was 112-122 days.

Observations of crops during the harvesting period showed different degrees of preservation of sunflower depending on care techniques. So, on average for 3 years (2018-2020) in the research, the highest preservation is 89.97% or 40.82 thousand plants per 1 ha out of 45.37 thousand ha. was indicated on the variant harrowing + prescheduled cultivation with introduction of Roundup herbicide (2 l/ha), and the smallest number of preserved sunflower plants 36.37 thousand hectares or 82.34% were determined on the control variant of harrowing + prescheduled cultivation. Application of 1 inter-row treatment combined with harrow and pre-harvest cultivation ensures preservation of plants at the level of 84.48%. Here, on average, in 2018-2020, during the harvesting period, 37.68 thousand plants per 1 ha were determined. Application of 2 inter-row treatments combined with harrowing and pre-sowing cultivation increases the safety of sunflower plants up to 86.66% (or 38.65 thousand hectares).

Weed plants cause great damage to the sunflower crop. Possessing a powerful underground and above-ground mass, sunflower competes with weeds better than many other field crops. Nevertheless, in weed-grown fields, its crop, according to VNIIMK, decreases by 2.5 c/ha [11, 12].

As accounting data showed, in our research of 2018-2020, the greatest impurity of sunflower crops was on options without the use of herbicides. So, on average, for 3 years in the phase of 2 real leaves, when using the technology, harrowing + pre-sowing cultivation (control) on 1 m<sup>2</sup>, there were 10.67 weeds with a raw weight of 31.22 g/m<sup>2</sup>. In options 3 and 4 harrowing + pre-harvesting + 1 interdivisional processing and harrowing + pre-harvesting + 2 interdivisional processing, the impurity of crops was 10.33 pieces with a raw weight of 31.87 g/m<sup>2</sup> and 10 pieces per 1 m<sup>2</sup> with a weight of 30.86 g/m<sup>2</sup>, respectively.

When using Roundup herbicide with the combination of harrowing and pre-sowing cultivation on sunflower crops in the phase of 2 real leaves, weed plants were not found. Weeds presented in the experiment: caseweed, wild spin, black bindweed, pigweed, wild radish, cocksfoot panicum, field bindweed, canada thistle.

On average for 2018-2020, in the flowering phase, the greatest impurity of sunflower crops was determined under control. Here, 44 weed plants with a raw weight of 207.33 g/m<sup>2</sup> were recorded per 1 m<sup>2</sup>. In the applications of 1 and 2 inter-row treatments, the number of weeds was 24 and 17.67 pieces with a weight of 139.0 and 114 g/m<sup>2</sup>, respectively (table 1).

Table 1 – Impact of care techniques on sunflower crops impurity, average for 2018-2020

Impurity indicators	Options for crop care			
	Harrowing + pre-harvesting (control)	Harrowing + pre-sowing cultivation with Roundup (2 l/ha)	Harrowing + pre-sowing cultivation + 1 interrow cultivation	Harrowing + pre-sowing cultivation + 2 interrow cultivations
Phase of 2 real leaves				
Number of weeds, pcs/m <sup>2</sup>	10,67	0	10,33	10
Weight of raw weight of weeds, g/m <sup>2</sup>	31,22	0	31,87	30,86
Flowering period				
Number of weeds, pcs/m <sup>2</sup>	44	10	24	17,67
Weight of raw weight of weeds, g/m <sup>2</sup>	207,33	57,33	139,0	114,00
Before harvesting				
Number of weeds, pcs/m <sup>2</sup>	47,67	12	27,33	20,33
Weight of raw weight of weeds, g/m <sup>2</sup>	233,33	69,33	165,33	136,0

In the flowering phase, we also determined impurity of crops of Roundup herbicide application option. In this version an average of 10 weed plants with a total crude weight of 57.33 g/m<sup>2</sup> were found over 3 years of research. In all the years, rains in the period of sunflower flowering and plumpness contributed to the growth and development of weed plants, which was especially seen in the conditions of 2019.

On average, in 3 years during the period of harvesting under control (harrow + pre-sowing cultivation), compared with the flowering phase, the number of weed plants increased by 7.67 pieces and impurity in this version was at the level of 47.67 pcs/m<sup>2</sup>. The weight of raw weights was 233.33 g/m<sup>2</sup>.

Under control, the increase in the number of weeds during the ripening period compared to the phase of 2 real leaves was 37 pcs/m<sup>2</sup>. When using Roundup herbicide with the combination of harrowing and pre-sowing cultivation during the ripening of sunflower, weed plants of 12 pcs per 1 m<sup>2</sup> with a raw weight of 69.33 g/m<sup>2</sup> were found.

The intermediate impurity position is occupied by options using 1 and 2 inter-row treatments. In these versions, by the ripening period, 27.33 and 20.33 weed plants with a raw weight of 165.33 and 136.0 g/m<sup>2</sup> were found on sunflower crops. On versions 3 and 4 harrowing + pre-sowing cultivation + 1 interrow cultivation and harrowing + pre-sowing cultivation + 2 interrow cultivation during the ripening period compared to the initial stage of development, the growth of weeds amounted to 17 and 10.33 pieces per 1 m<sup>2</sup>.

One of the most important indicators of sunflower productivity is the height of plants, photosynthetic potential and the dynamics of leaf surface formation.

In the conditions of 2018-2020, in the flowering phase, the highest indicators of sunflower leaves area, we determined when using the technology of harrowing + pre-sowing cultivation with the introduction of Roundup herbicide (2 l/ha) - 13.77 thousand m<sup>2</sup>/ha.