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Potential of ecological wayof monitoring of weeds

Goal. The search for new alternative methods of controlling weeds in broad-leaved crops of agricultural crops. Methods. Experiments are small-sized fields, made in 2010-2012. The area of the sown area is 36 m2, the registration number is 25 m2, the repetition is 4 times. The records and observations in the experiments were performed in accordance with the requirements of the methodology (S.O. Tringle, 2001). Results The successive cutting of the above-ground parts of weed stands in the inter-row row of sugar beet crops provided a reduction in their number from 86.4% (1 cutting) to 97.9% (3 consecutive cutting). The amount of accumulation of weeds in the crops was less than 5.44 times in comparison with the zones of inbred control. The yield of root crops of sugar beet crops was 56.7 t / ha, or less than the yield of crops using protection with herbicides by 7.5%. Conclusions The mechanical method of controlling weeds in broad-leaved crops is environmentally friendly, and for timely and systematic applications, there is a prospect of wide practical application.

Key words: sugar beets, weeds, herbicides, mechanical damage, weight of weeds, yield.

The cultivation of agricultural crops by means of modern technologies provides for the broad application of herbicides to protect crops from weeds. Practice proves the effectiveness of such a way of controlling the weeds, but at the same time it reveals a high level of anthropic pressure on the environment, first of all, the chemical contamination of arable land and the yield of agricultural produce [1, 2]. An intensive sugar beet growing technology, for example, provides for the necessary level of control of weeds' stacks to carry 5-9 liters per hectare of herbicides as a result of 3 to 5 successive sprays of soil or stacks of plants [4 , 5]. In the countries of the Common Market, where the level of intensity of cultivation technologies is significantly higher, weeds resistant to herbicides of continuous action on the basis of glyphosate, now scientists-gerbologists number more than 60 species [3]. Resistant populations to the action of herbicides of the fungus mosaic virus Alopecurus myosuroides Hads [6 - 9] became a very acute problem in Australia's arable land. Similar problems with resistant populations of weeds from the botanical families of Amaranthaceae, Chenopodiaceae, Poaceae, Polygonaceae, Solanaceae and other up to 6 most common mechanisms of action of modern herbicides have become very acute in the arable lands of North and South America, South Africa and others. continents [10 - 15].

Biological and biodynamic agricultural systems, vegetable growing technologies, especially green crops, and baby food products, in accordance with sanitary and hygiene regulations, generally prohibit the use of herbicides in the process of their cultivation.

The aim is to find and evaluate new alternative methods of controlling weeds in broad-spectrum crops of agricultural crops.

In the Laboratory of Herbology of the Institute of Bioenergetic Cultures and Sugar Beet NANA in 2010 - 2012, field investigations of biological reactions of plants to mechanical damage were conducted and a mechanical method of controlling the weeds was developed on the basis of them.

The method of conducting research. Research - field small-town. The area of the seed area of beet sugar - 36 m2, accounting - 25 m2, repetition of studies - 4-time. Seed-up seed beet seedling beet seedling was grown in accordance with the requirements of the intensive technology recommended for the forest-steppe zone. The scheme of research provides the following options:

1. Seeds of sugar beets are vegetated without the application of protective measures against weeds.

2. In the crops of sugar beetroots, one cutting of weeds in intermediate rows (in the stage of formation of weeds of 4 leaves) was carried out.

3. In sugar beet crops, 2 successive cuttings of weed stands in intermediate rows (the first - in the phase of formation of weeds of 4 leaves, the next - after 15 days after the previous one) were carried out.

4. Seeds of sugar beet seeded 3 successive cutting of weed weed intersections (the first - in the phase of formation of weeds of 4 leaves, the following - sequentially 15 days after the previous ones).

5. In sugar beet crops, protection from weeds was carried out using herbicides (3 sequential spraying of herbicide stairs). Betanal expert OF + karibu + trend-90 + + miura (betanal expert OF k.e., active prescriptions: fenmedipham-91 + desmedifam - 71+ + ethofumezate - 112 g / l; caribus, d.r .: triflu - sulfuron-methyl - 500 g / kg, miura k.e., d.r. - hizalofop-P - ethyl - 125 g / l).

6. Seeds of beet sugar were vegetated without negative influence of weeds (carried out by 5 successive rooting of crops manually).

The first spraying - in the phase of cotyledal in the plants of culture, the next (2-th) in 7 days, 3-th - in 10 days after the 2nd. The rules of introduction: 1) the betanal expert ОФ - 1 l / ha; 2) the betanal expert OF + karibu + trend-90 (1,0 + 0,03 + 0,2 l / ha); 3) the betanal expert OF + Karibu + trend-90 + miura (1,0 + 0,03 + 0,2 + 0,6 l / ha). The width of row spacings in sugar beet crops is 45 cm. The width of the protective zone is 15 cm (7.5 cm on each side of the row). Complete stairs of plant crops on crops were recorded: in 2010 - April 26, 2011 - May 3, in 2012 - April 29.

The recording and monitoring of weeds and crops was carried out in accordance with the requirements of the methodology [6]. The accounting of the number of weeds plants weeds in sugar beet crops was carried out prior to the application of herbicides and mechanical damage and 10 days after the last application of herbicides and mechanical damage.

The mass accumulation of weeds in the crops was determined at the beginning of the third decade of July, during the period of its maximum formation. The crop yield was recorded after the complete excavation of crop plants at the counting sites and weighing of grain crops. The content of sugar and conductivity ash in sugar beet root crops was determined by the method of "cold degustation" on a precise analytical line "Venema".

Discussion and research results. Field studies conducted in 2010-2012 showed significant fluctuations in the structure of indigestion of crops, but the species composition of the weeds was relatively stable. Agitation was mixed.

Record of the level of disturbance of crops (pc. / M2) was carried out before the first cut of weeds in intermediate rows and during determination of weeds in the III decade of July.

At the time of the first counting on the seed of option 1, the total number of stairs weeds fluctuated over the years of research from 111.8 pcs./m2 in intermediate rows (2010) to 128.9 pcs./m2 (2012).

Among the weed species, the white lobos stairs were the most massive (19.1 pc / m2 in inter-row) in 2011 and amounted to 15.5% of the total number of weeds. Stairs of ordinary (bent) most massive (18.7 pc / m2 interstices) were in 2012, stacks of black currant millet - respectively, the most massive (23.9 pc / m2 in row spacings) were in the vegetation of 2011 In the structure of weeds, they accounted for 19.4%.

On average, during the years of research, the number of weeds of various species was 137.8 pcs./m2 (Table 1).

Carrying out one cutting of weed stands induced disstress in the plant stairs and significantly influenced their number. By the time of the next counting of the numbers (the third decade of July), taking into account the emergence of new stacks of weeds, the infiltration of crops in intermediate terms amounted to an average of 16.5 pcs./m2.

The implementation of two successive cuttings of weeds (the second one was carried out 10 days after the first, option 3) substantially supplemented and exacerbated the state of distress from the loss of aboveground parts of young surviving weed plants. Their total number of years of research compared with the number of plants in the crops of variant 1 was lower by 95.4% and was 5.6 pcs./m2.

Carrying out three consecutive cuttings of stairs in the intermediate row of sugar beet crops (variant 4) ensured a general decrease in the number of weed plants by 93.9% compared with their number in crops option 1 (control).

Measures for protecting sugar beet crops by mechanical means influenced not only the number of weeds, but also their ability to form an overweight of plants. The calculation of the magnitude of the accumulation of weeds in the intermediate row of sugar beet crops on the third decade of July (the period of formation of the largest overland mass of weeds in broad-leaved crops) in the years of research has shown that such an effective level of protection due to the influence of successive disstras is practically non-existent is inferior to the effectiveness of the system of sequential spraying with selective herbicides (option 5).

However, the use of a system of consistent mechanical damage has its disadvantages. This method does not allow to provide the necessary protection of crops from weeds in the protective zone of lines, given that the protective zone of a row in sugar beet cultures can traditionally be 10 to 15 cm wide (5 or 7.5 cm from each side axis of the line of cultural plants). Accordingly, in the protective zone of the strings, under the protective shields and stairs of weeds, first of all those located directly close to the plants of the crop, are found. They are left unharmed. In crops of agricultural crops with a width of rows of 45 cm in the protective zones of the lines fall under the protective shields from 22,2% (width 10 cm) to 1/3 (width 15 cm) area of the field.

Under the conditions of complete exclusion of other methods of controlling the weeds in the zone of rows of plant crops during their growth on them the corresponding mass of weed plants is formed. The calculations of the amount of accumulation of weeds during the years of research show that, by the third decade of July, mass accumulation may be substantial. The weight of weeds (cheese) in row spacings, converted to 1 m2 of crop area, fluctuated during the years of research from 2703 g / m2 in 2010 to 3406 g / m2 during the vegetation of 2012 (Table 2).

In the protective zones of the strata, where the protective measures of weed plants did not damage or induce disstresses, their vegetation took place in a competitive relationship with sugar beet plants. Compared to completely sifted crops, plants of culture, in fact, without the presence of weeds in intermediate rows, had certain advantages. They were manifested not only in limiting the competitive ability of weed plants in protected zones of the line, but also in the ability to receive light energy from spaced-apart layers of culture and provide intensive photosynthesis. Under such vegetation conditions, weeds were not able to adequately cover plants of culture. The total mass of weed plants in the zone of lines on the beet crops was significantly smaller in terms of mass in the abundant crops of variant 1. As a result of the account of the mass of such weeds in the protective zones of the lines, the wet masses of weeds were recorded respectively: in 2010 - 454 g / m2, in 2011 - 508, 2012 - 567 g / m2 of the protective zone of the line (width 15 cm).

Weed plants in the protective zone of rows negatively influenced the yield of sugar beet crops and the quality of the obtained root crops.

In sugar beet crop variant 1, where weeds were able to grow and grow freely, competition with crop plants was acute. Accordingly, the yield of root crops was low. Lowest yield was in a growing vegetation in 2012 and amounted to 8.6 t / ha of small roots. Their sugar content was low - 13.22%, and the content of soluble ash (conductometric ash) was 1.1%, respectively, high.

On average, in 2010-2012, the yield of root crops on varieties of seedlings 1 (freeze control) was 13.4 t / ha of small crops with a sugar content of 13.49% and a content of soluble ash 1.1%. Under such vegetation conditions, sugar beet harvesting from sugar beet crops was low - 1.81 t / ha (see Table 2).

A single damage of weeds in intermediate rows provided induction of dystrusia to reduce the ability of weeds to form a mass in intermediate rows up to 506 g / m2, or 85% compared to crops in variant 1 (infiltrated control). Even taking into account the weight of weeds in the protective zone of lines (an average of 510 g / m2), the total weight of weeds in sugar beet crops was 1016 g / m2, or three times less compared to crops in variant 1.

Due to The best mode of energy supply of sugar beet plants, their productivity was significantly higher. The yield of root crops during the years of conducting research averaged 50.3 t / ha with a sugar content of 16.48% and a soluble content of 1.05%. Sugar collection - 8.29 t / ha.

Reducing the ability of weeds to accumulate its mass due to the need to overcome the adverse effects of distress in sugar beet crops at the time of the record keeping (the third december of July) provided more favorable conditions for the cultivation of plants and the formation of correspondingly larger crop yields.

After two successive cuts (option 3), the above-ground parts of weeds in crop rows and induced sequences the disstress their weight at the time of the record was an average of 191 g / m2. Taking into account the presence of weeds in the protective zones (510 g / m2), the total mass of unwanted vegetation was 701 g / m2. Accordingly, under such vegetation conditions, plant crops formed the yield of root crops of 55.2 t / ha with a sugar content of 16.62% and a content of soluble ash of 0.99% and a sugar harvest of 9.17 t / ha.

The application of three successive cuttings of weed stands in the intermediate row of crops (option 4) and the need to overcome the consequences of successive disstrasts facilitated their reliable control. The average weight of weeds during the years of research was 53 g / m2. Taking into account the presence of weeds in the protective zones (510 g / m2), the total volume reached 563 g / m2. The sugar beet plants on option 4 seedlings form a yield of 56.7 t / ha of root crops with a sugar content of 16.7%, a soluble leaf content of 0.96%, and a sugar collection of 9.47 t / ha.

In the beet crop plants using a system of chemical protection from weeds (3 sequential spraying of stairs with herbicides), the average weight of weeds at the time of the record was 61 g / m2. The advantage of this method of protection is the possibility of selective action of herbicides. Accordingly, for the spraying of the entire area of crops, it is not necessary to form the protective zones of the rows and restore the weed plants in them.

The presence of such a number of weeds had little effect on the level of yield of sugar beet crops. The average yield of roots in experiments on option 5 was 61.3 t / ha with a sugar content of 16.64%, a soluble ash content of 1%, and a sugar collection of 10.20 t / ha.

On the crops of variant 6, where the negative effect of weeds was practically non-existent, the yield of root crops was the highest in the experiments and amounted to 64 t / ha on average, the sugar content was 16.83%, the content of soluble salts was 0, 97%, sugar collection - 10.77 t / ha.

Analysis of the level of sugar beet yields under different vegetation conditions indicates that the application of a mechanical method of protection against weeds is sufficiently acceptable. Even in the presence of weeds in the protective zones of the lines, the yield of crops using three successive cuttings of the stairs in intermediate rows (option 4), the yield of root crops during the years of research was in the range from 54.8 t / ha (2010) to 59.3 t / ha (2011), or 87.8% and 89.3% respectively of the possible level in the experiment (option 6).

On average, during the years 2010 - 2012, the yield of root vegetables using the mechanical method of weed control (option 4) was 56.7 t / ha or 92.5% of the yield level using the chemical method , or 88,6% of the maximum possible in experiments (control without negative influence of weeds on sugar beet plants).

Conclusions

A mechanical way of controlling the weed hedges by inducing deep post-dysstratism of their plants, especially in a timely manner, in the system of row spacing in sugar beet crops, makes it possible to reduce the number of unwanted stairs from 86.4% (1 cut) to 97 , 9% (3 cuttings) and reduce the ability of weed plants to form mass by 83.4% and 98.3% respectively.

In the protective zones of the rows, in the absence of a mechanical method of controlling the stacks, in the process of growing the crops accumulated up to 509 g / m2. Such sugar beet crops had a mass of weeds of 5.44 times less compared to those on infested control.

Crop yield of beet sugar using a system of successive mechanical damage (3 cutting) and induction of successive disstresses in the weed hens during the years of research made an average of 56.7 t / ha of root crops, or 92.5% of the level of yield crops with effective protection from weeds for using herbicides, or 88.6% of the crop yields in option 6 (crops that were vegetated without the adverse effects of weeds). The mechanical method of controlling weeds in broad-leaved crops for timely and systematic damage to the terrestrial parts of the stairs has a significant protective potential, which makes it possible to obtain good crops without the use of chemical protection methods and increase the environmental quality of cultivation technologies.

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