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ZADOROZHNYI V., Candidate of Agricultural Sciences

KARASEVICH V., Candidate of Agricultural Sciences

MOVCHAN I., KOLODIY S.

Institute of Feeds and Agriculture of Podillya of NAAS

HARMFUL WEEDS AND THEIR CONTROL IN CHICKPEA CROPS IN CONDITIONS OF RIGHT-BANK FOREST-STEPPE UKRAINE

It was shown the results of the study of hazard annual weed species and biological efficacy of a number of herbicides in crops of chickpea. Established that chemical weed control reduces weed to 81-89 % and increase crop to 0,72-0,84 t/ha.

Keywords: chickpea, weeds, harmful weeds, herbicides, yield, biological efficiency of cultivation

Introduction. Legumes are the most important source of vegetable protein for animal feeding and nutrition of people in the world [1,2]. In addition to solving the problems of feed protein, legumes play a role in the sustainability of agro-ecosystems in all areas of soil and climatic regions of Ukraine [5, 10, 13].

The current trend toward climate warming needs to be reviewed not only technological methods of cultivation of cereal and leguminous crops (dates and methods of sowing, seed rate, care of crops, etc.), but also find more crops adapted to climate change, which significantly affected overall by grain farming of Ukraine [1].

One of the most perspective legumes under steppes in the coming years could become a regular chick. Globally, agriculture crops Chickpea ranks third among pulses after soybean and beans and are about 12 million/ha, India - 8 million hectares [4].

In recent years, chickpea crops were rapidly spreading in Ukraine, first in the south, and in the steppe region. At present the area of culture in our country take about 60-70 thousand hectares and are increasing [16].

Of all the legumes chick has the highest drought resistance and heat resistance, in addition to soils [6, 11, 12]. A positive feature of chickpeas as officers is that it is not damaged by bruhus [11].

The seeds chickpeas contains 28-32 % protein and 7% oil. Seeds of chickpea contains antinutrient compounds and therefore no need for heat treatment in animal feed. Furthermore, after collecting the culture on each hectare of crop remains still much nutrients as paid from 15-20 tonnes of compost [10, 14, 17].

Chickpeas is a plant of high culture farming, the presence of weeds in crops leads to severe depression, especially in the early stages of growth. The large number of weeds at harvest can also lead to poor quality chickpeas yield [4,5,15].

The purpose of our research was to investigate the hazard and development of chemical weed control measures in crops of chickpeas in conditions of Right-Bank Forest-Steppe of Ukraine.

Material and methods. Field research was conducted in 2011-2013 by the conventional methods [7,9] in the stationary experiment of the State Enterprise "Research Farm "Bokhonytske" of the Institute of Feeds and Agriculture of Podillya of NAAS" in 2010-2012. Soils of the trial field were grey forest mid-loamy by texture, having the following characteristics of topsoil: humus (by Tyurin) - 2.2-2.4%, pH (saline) – 5.2-5.4; hydrolyzed nitrogen (by Kornfield) – 9.0-11.2; labile phosphorus (by Chirikov) – 12.1-14.2, exchange potassium – 8.1-11.6 mg.- equivalent per 100 g of soil.

Weather conditions during the years of growing seasons studies differed significantly from long-term indices for rainfall and temperature conditions. Thus, in 2011 and 2012 respectively rain fell in 97 and 150 mm less than the long-term norm. While in 2013 the total precipitation for April - September were within normal limits. The air temperature in 2011, 2012, 2013 (growing season)

was respectively higher by 1,1; 2,5; 1,3 ° C in comparison to the average long-term norm . It should be noted that in 2013, in June rain fell 1.5 times more than the rules that contributed to mass destruction chickpea plant diseases such as anthracnose and fusarium . According to the Institute of Plant Breeding and Genetics NAAS concentration of crops over large areas, unusually wet conditions during the growing season chickpea in southern Ukraine , as well as the uncontrolled importation and planting the seeds of unknown origin led to epiphytotic most current sorry for this crop diseases - ascohitoz and fusarium. Under favorable conditions of pathogens , crop losses by ascohitoz can reach 100%. The lesion develops more intensively for a long cool rainy weather . [5]

Chickpea varieties "Roseanne" sown in the third decade of April whiderow way of spacing - 45 cm predecessors - winter wheat. Seeding - 500 seeds per ha. For the determination of hazard and critical periods of weed competition relations with their chickpea plants (model experiments) Size sown area was 2.7 m², accounting - 1.8 m². Placement areas - regular five tiers. The mass of weeds was determined in the phase of full ripeness chickpeas. Weed density formed after emergence of culture by removing excess plants by hand according to the scheme of the experiment. Stairs weeds that emerged during the growing season, destroyed. In the experiment to determine the critical period of weed harm in their chickpea crops were removed manually every 10 days after emergence of culture for 50 days.

In studying the effectiveness of chemical events weeding area accounting area was 20.2 m². Repeated three times . Systematic placement sites in three tiers. Soil herbicides have made immediately after sowing chickpea and postemergence - a phase 2-3 true leaves culture sprayer PL-2 «System Agrotop». Flow rate of the fluid - 250 l/ha. Accounting weed-infested carried out in the following terms :

- Before making postemergence herbicides ;
- 30 days after postemergence herbicides making ;
- Before harvesting.

Accounting for harvest in model experiments were carried out manually, and the herbicidal areas - direct selective harvester threshing «Sampo-130».

Results and discussion. The analysis of the data revealed that chickpea crops have low competitive activity against weeds. A significant decrease in performance (9.9%) was observed in the presence of 10 weed plants per square meter. With increased density of weeds and 25 weeds/m² marked decrease in crop production by 23.7 %. The presence of 50 crops of chickpeas pieces/m² weeds with raw weight 812 g/m² indication to decrease crop production by 38,2 %. In embodiments of natural weediness, which was 93.5 weeds/m² yield losses reached 58.7 % compared to control (Table 1)

Table 1

Effect of different amounts of weeds and their weight in chickpea yield, on average, for 2011-2013

Number of weeds, weed per m ²	Wet weed weight, g/m ²	Wet weed weight of one plant, g	Yield, t/ha	Reducing yield to control	
				t/ha	%
0 (control)	0	0	1,52	–	–
2	64	32	1,46	0,06	3,9
5	136	27	1,40	0,12	7,9
10	248	25	1,37	0,15	9,9
25	429	17	1,16	0,36	23,7
50	812	16	0,94	0,58	38,2
Nature weed infestation, 93,5 weed per m ²	1296	14	0,63	0,89	58,6

LSD₀₅, t/ha

0,06-0,11

Determination of the critical period of competitive interrelations between plants and weeds chickpeas makes it possible to take action to last before they cause significant damage to the culture. From the analysis of the results of research shows that in areas where weeds are destroyed 10 days after germination seed yield of chickpea crops decreased by only 0.09 t/ha or 6.4 % (Table 2). When weeding 20 days after emergence chickpeas marked significant reduction in yield, which constituted 12.1 % of the control, where weeds are destroyed during the growing season. In areas where the weeds in crops were for 30 , 40 , 50 days after emergence of culture, crop losses were respectively 0.32 t/ha (22.7 %), 0.42 t/ha (34.8%) and 0.70 t/ha (49.6 %). The maximum reduction in the yield - 59.6 % observed in the presence of weeds throughout the growing season crops.

In Ukraine today is officially not a single herbicide approved for use on crops chickpea. Basically the agronomic controls weeds. However, the long experience gained by the use of a number of herbicides both in our and other countries [5,8,10,14,15].

Table 2

Determination of critical period of weed interference competition and chickpea plants, average for 2011-2013

Research variant	Yeild, t/ha	Reducing yield	
		t/ha	%
Weeds were taken during the growing season	1,41	–	–
Weeds were leaving during the growing season	0,57	0,84	59,6
Weeds were taken in 10 days after emergence of culture	1,32	0,09	6,4
Weeds were taken in 20 days after emergence of culture	1,24	0,17	12,1
Weeds were taken in 30 days after emergence of culture	1,09	0,32	22,7
Weeds were taken in 40 days after emergence of culture	0,92	0,42	34,8
Weeds were taken in 50 days after emergence of culture	0,71	0,70	49,6

LSD₀₅, t/ha

0,04-0,13

In this regard , the crops of chickpeas studied the efficacy and selectivity of soil herbicides like stomp , 33% KE , harnesses , 90% of KE , frontier Optima , 72% KE and post - pivot , 10% v.r.k. , bazahran , 48% VR, pulsar , 4% VR, harmony, 75% VG

Crops were mixed type of weed-infested advantage of annual grass species, namely 55-63 % of the total. The dominant weeds were: gray foxtail (*Setaria glauca* L.), white quinoa (*Chehopodium album* L), common amaranth (*Amarantus retroflexus* L.), halinsoha dribnokvitkova (*Galinsoga parviflora* L.). The number of weeds was within 152-162 pieces/m² and they were in the phase of 2-5 leaves.

Analysis of the results showed that the application of herbicides stomp – 4,0 l/ha weediness decreased by 85 % (Table 3). Was highly effective application Harnesses (3,0 l/ha) and Frontier Optima (1,0 l/ha), while weediness decreased by 89 %. It should be noted that the investigated soil herbicides do not inhibit plant chickpeas, liquefaction density is also observed. Therefore, the increase in seed yield in these areas was 0.79 - 0.84 t/ha.

By spraying herbicide pivot chickpeas (0,8 l/ha) destruction of weeds reached 80 %. But on the second day after making Pivot been noticed slight clarification (yellowing) chickpea plants . After 6 - 8 days of culture plants returned to normal. Herbicide pulsar (0,9 l/ha) as destroying weeds both biological groups , resulting weediness total crop was reduced by 81%. Inhibition of crops in areas treated with this herbicide were found. In general , the value stored harvest crops in these areas was within 0,72-0,76 t ha.

Herbicide harmony (8 g/ha) dicotyledonous weeds destroyed because of their total number was reduced by only 53%. This Herbicide was high selective to chickpeas plant.

Table 3

Effect of herbicides on weediness and yield of chickpea, the average for 2011-2013

Research variant	Application rate of the herbicide, l/ha	Weed quantity, weeds per m ²	*weed destruction, %	Weight of weeds in the end of vegetation, g/m ²	Yield	
					t/ha	± to control, t/ha
Control 1 (without herbicides and hand cutting)	–	145,3	-	1028 (0)	0,51	-
Kontrol 2 (hand cutting)	–	0	100	0 (100)	1,40	0,89
Stomp, 33% к.е. before germination	4,0	22,3	85	151 (85)	1,23	0,72
Harnes, 90% к.е. –//–	3,0	15,8	89	115 (89)	1,35	0,84
Fronter optima, 72 % к.е. –//–	1,0	16,7	89	135 (87)	1,32	0,81
Pivot, 10%, v.r.k. in phase 2-3 leaves of chickpea	0,8	28,7	80	204 (80)	1,25	0,74
Pulsar, 4 % v.r. –//–	0,9	28,3	81	193 (81)	1,24	0,73
Harmony, 75% v.g. –//–	8 г	79,7	45	488 (53)	0,94	0,43

LSD₀₅, t/ha

0,03-0,13

* Note: The destruction of weeds 30 days after postemergence herbicides intaking
In brackets - the reduction weight of weed in % to control 1.

Conclusions. Established that measures to protect crops from weeds chickpeas should be carried out immediately in the presence of 10 weed/m² annual weeds and complete a 20-day period from the emergence of culture.

The high selectivity and herbicidal activity in chickpea crops found soil applications: stomp, 33% KE (4.0 l/ha), harnesses, 90% of KE (1.5-3.0 l/ha) frontier optimal (0.8-1.0 l/ha). Reduced weed-infested thus constituted 85-90 % and increase yield was 0,72-0,84 t/ha.

With postemergence herbicides in chickpea crops in conditions of mixed type was the use of weed-infested appropriate pulsar (0.9 l/ha) and pivot (0.8 l/ha). Weed reducing was 80-81 %, and increase the harvest is about 0,73-0,74 t/ha.

Against dicotyledonous weeds best effectiveness was when applying herbicide Harmony (8 g/ha)

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Анотація

Задорожний В.С., Карасевич В.В., Мовчан І.В., Колодій С.В.

Шкідливість бур'янів та їх контролювання в посівах нуту в умовах

Правобережного Лісостепу України

Наведено результати вивчення шкідливості однорічних видів бур'янів, а також біологічної ефективності ряду гербицидів у посівах нуту посівного. Встановлено, що хімічне прополювання посівів нуту забезпечує зниження забур'яненості на 81-89 % та приріст врожаю насіння – 0,72–0,84 т/га.

Ключові слова: нут, бур'яни, шкідливість бур'янів, гербициди, урожайність, біологічна ефективність, вирощування

Аннотация

Задорожний В.С., Карасевич В.В., Мовчан И.В., Колодий С.В.

Вредоносность сорняков и их контролирование в посевах нута в условиях

Правобережной Лесостепи Украины

Приведены результаты изучения вредоносности однолетних видов сорняков, а также биологической эффективности ряда гербицидов в посевах нута посевного. Установлено, что химическая прополка посевов нута обеспечивает снижение засоренности на 81 – 89 % и прибавку урожая семян 0,72 – 0,84 т/га.

Ключевые слова: нут, сорняки, вредоносность сорняков, гербициды, урожайность, биологическая эффективность, выращивание