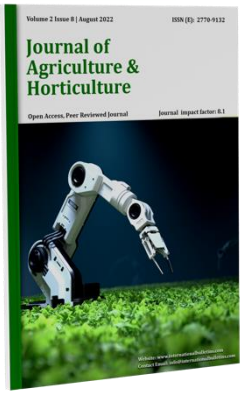

POSITIVE EFFECTS OF SENICATION AND DESICCATION AGRONOMIC PRACTICES IN GRAIN CULTIVATION

Boyqobilov To'lqin Choriyevich
Independent Researcher, Tashkent State Agrarian University
https://doi.org/10.5281/zenodo.15523691

Introduction. One of the most important tasks facing agriculture today is ensuring the population's need for quality food products, particularly grain and grain-based products. This, in turn, requires improving the agrotechnical measures for growing winter wheat, as well as developing scientifically grounded methods aimed at increasing both yield and grain quality indicators. From this perspective, a thorough study of senication and desiccation practices and an evaluation of their effectiveness is of great relevance today.

Senication is an agronomic intervention carried out during the milk-wax ripening stage of wheat, aimed at directing the nutrients accumulated in the stem and leaves toward the spikelets. This accelerates and standardizes grain ripening while improving quality indicators such as gluten content, protein levels, and others. This is especially crucial for enhancing grain quality and making it more competitive for export.

Desiccation, on the other hand, is primarily carried out before harvest in fields infested with perennial weeds. Weeds such as couch grass, saltwort, barnyard grass, and reed grass seriously hinder harvesting equipment and lead to yield losses. Desiccation is a preventive measure aimed at addressing this issue. Furthermore, under conditions of climate variability, such as uneven precipitation during spring and summer and sudden temperature fluctuations, the implementation of these practices plays a significant role in stabilizing yields and preventing losses.

Thus, the development and application of scientifically based senication and desiccation practices are among the most urgent issues in today's agricultural sector.

Literature Review. In the early years of our country's independence, the grain yield was recorded at 22.2 centners per hectare in 1991, 32.7 c/ha in 2001, and an average of 55.0 c/ha in 2015. This growth occurred not through the expansion of cultivated areas, but mainly due to increased productivity per hectare [1].

The main share of grain yield is attributed to winter wheat grown primarily on irrigated lands [2].

Senication and desiccation are agronomic methods used to accelerate plant ontogenesis, although their mechanisms differ [3]. The mechanism of desiccation is primarily based on the irreversible damage caused by desiccant substances to the colloids of the plant cell protoplasm, leading to a physical dehydration process of plant tissues. In this process, the green parts of the plants absorb active contact substances, such as hydrogen peroxide, which disrupt cell membranes and lead to the withering of the plants [4].

In contrast, senication is a physiological process aimed at accelerating plant metabolism, enhancing the flow of assimilates from vegetative organs to generative organs such as fruits and seeds. During the senication process, plants are supplied with macro- and microelements

through foliar fertilization with mineral nutrients, which helps accelerate ripening and improve grain filling [3].

Y.A. Romanko and A.V. Melnik emphasize the differences between the mechanisms of senication and desiccation. According to them, desiccation accelerates dehydration and cellular damage in plants, leading to their drying out. Senication, on the other hand, aims to increase productivity through the enhancement of physiological processes.

Methods. In this research, field experiments, phenological observations, and biometric measurements were conducted in accordance with the guidelines provided in *Methods for Conducting Field Experiments*, while grain chemical composition was determined based on I.A. Ermakov's manual *Methods of Biochemical Research of Plants*. The obtained data were subjected to mathematical and statistical analysis using B. Dospekhov's method.

Results. In winter wheat, senication was carried out during the milk-wax ripening stage by applying ammonium sulfate fertilizer. The biometric characteristics of the spike were analyzed in the treated option s. According to the results, in the control option of the "Krasnodar-99" variety, the average number of grains per spike was 41.4, grain weight was 1.55 g, and the weight of 1000 grains was 42.3 g. In the "Tanya" variety, these indicators were 42.3 grains, 1.59 g, and 43.2 g, respectively.

In the option s where senication was performed using ammonium sulfate at a rate of 25–30 kg/ha, the "Krasnodar-99" variety showed 40.4–41.0 grains per spike, grain weight of 1.61–1.64 g, and 1000-grain weight of 45.8–46.7 g. For the "Tanya" variety, these indicators were 41.3–41.9 grains per spike, grain weight of 1.65–1.68 g, and 1000-grain weight of 46.8–47.7 g.

In the option s where ammonium sulfate was applied at a rate of 40–50 kg/ha, the "Krasnodar-99" variety recorded 41.4–42.3 grains per spike, grain weight of 1.60–1.61 g, and 1000-grain weight of 45.1–46.7 g. For the "Tanya" variety, these values were 41.3–43.2 grains per spike, 1.64–1.68 g grain weight, and 1000-grain weight of 46.1–47.7 g.

According to the results, the "Tanya" variety demonstrated higher indicators in terms of grains per spike, individual grain weight, and 1000-grain weight compared to the "Krasnodar-99" variety. In both varieties, morphological indicators of the grain improved positively with the application of senication at different ammonium sulfate rates.

An increase in grain weight per spike was accompanied by an increase in 1000-grain weight, and the correlation coefficient between these two indicators, calculated according to Dospekhov's method (1979), was $r = 0.856$ ($R^2 = 0.7321$), indicating a strong positive correlation.

The effect of senication during the milk-wax ripening stage on grain and straw yield of winter wheat was also studied. According to the research results, the average grain yield in the control option (without senication) of the "Krasnodar-99" variety was 63.4 c/ha, and the straw yield was 63.53 c/ha. For the "Tanya" variety, these figures were 64.8 c/ha and 65.96 c/ha, respectively.

In the senication option with 25 kg/ha of ammonium sulfate, the grain yield of "Krasnodar-99" was 65.7 c/ha—2.3 c/ha more than the control. In the "Tanya" variety, the grain yield reached 67.5 c/ha, exceeding the control by 2.7 c/ha. Straw yield also increased in both varieties by 2.38–4.17 c/ha compared to the control.

The highest yield results were recorded in senication option s using ammonium sulfate at 30–40 kg/ha. In the "Krasnodar-99" variety, the grain yield reached 66.0–66.1 c/ha, and the

straw yield reached 67.2–67.3 c/ha, providing an additional yield of 2.65–2.67 c/ha (grain) and 2.68–2.71 c/ha (straw). For the "Tanya" variety, the grain yield increased up to 67.7–67.8 c/ha, and the straw yield rose by 4.11–4.44 c/ha (Table 1).

In the senication option s where ammonium sulfate was applied at a rate of 50 kg/ha, the "Krasnodar-99" variety produced an additional 2.10 c/ha of grain and 2.17 c/ha of straw yield. For the "Tanya" variety, grain and straw yields reached 67.4 c/ha and 68.6 c/ha, respectively.

However, analysis revealed that in the 50 kg/ha senication option s, both grain and straw yields were slightly lower compared to those in the 30–40 kg/ha treatment range. This outcome is attributed to the intensified stimulating effect of ammonium sulfate on winter wheat, which may have caused an excessive diversion of water and nutrients from the leaves to vegetative organs.

Thus, it can be concluded that while applying ammonium sulfate at a rate of 25–30 kg/ha during senication had a positive effect on increasing both grain and straw yields of winter wheat, applying it at 50 kg/ha resulted in a reduction in overall yield.

Table 1

Effect of Senication on Grain and Straw Yield of Winter Wheat Varieties, c/ha Tashkent, 2015–2017

№	Options	Application kg/ha	Grain yield, c/ha		Straw yield, c/ha	
			average	difference control	average	difference control
Krasnodar-99						
1	control	-	63,4	-	64,5	-
2	Ammonium sulfate fertili	25	65,7	2,30	66,9	2,38
3		30	66	2,65	67,2	2,68
4		40	66,1	2,67	67,3	2,71
5		50	65,5	2,10	66,7	2,17
Tanya						
1	control	-	64,8	-	66,0	-
2	Ammonium sulfate fertili	25	67,5	2,70	68,7	4,17
3		30	67,7	2,90	68,6	4,11
4		40	67,8	3,00	69,0	4,44
5		50	67,4	2,66	68,6	4,07

Studying the factors influencing the quality of winter wheat grain is of great importance. Research results have shown that the application of ammonium sulfate during the milky-wax ripening stage of winter wheat has a positive effect on grain quality. The highest results were observed when ammonium sulfate was applied at a rate of 25–30 kg/ha: under these conditions, the IDK (gluten deformation index) reached 100 units, gluten content was 33.3–33.5%, and grain translucency was 48.7–49.7%. At the same time, applying ammonium sulfate at higher rates of 40–50 kg/ha led to a slight decline in grain quality indicators.

In studies conducted from 2015 to 2017 in the Tashkent region, the types, quantities, and infestation levels of perennial weeds in winter wheat fields were examined prior to desiccation.

In the 2015 study, the control plots revealed the presence of 16 field bindweed (Aeluropus littoralis) and 13 Johnson grass (Sorghum halepense) weeds. As no desiccation was performed, these weeds proliferated actively. When the liquid defoliant "LiquidXMD" was applied at a rate of 6.0–7.0 L/ha, after 12 days, 83.9–88.1% of field bindweed and 74.2–75.0% of Johnson grass had dried. Increasing the application rate to 8.0–9.0 L/ha resulted in drying of 91.8–95.5% of field bindweed and 76.9–86.7% of Johnson grass.

When the defoliant "UzDEF" was applied at a rate of 6.0 L/ha, after 12 days, 54.2% of Johnson grass and 84.7% of field bindweed had dried. Increasing the rate to 7.0–8.0 L/ha improved drying effectiveness to 69.2–78.6% for Johnson grass and 91.3–92.5% for field bindweed. At the highest tested rate of 9.0–10.0 L/ha, drying reached 79.2–85.7% for Johnson grass and 92.9–93.3% for field bindweed.

In the 2016 studies, wheat fields infested predominantly with *Plantago* and *Common Plantain* (Amaranthus retroflexus) weeds were selected. When desiccation was carried out using the liquid defoliant "LiquidXMD" at a rate of 6.0 L/ha, after 12 days, 71.4–75.0% of *Plantago* and 79.2–81.4% of *Common Plantain* had dried. Increasing the application rate further enhanced weed desiccation, with *Plantago* drying reaching 78.9–81.3% and *Common Plantain* 80.0–85.7%.

When the defoliant "UzDEF" was applied at a rate of 6.0 L/ha, *Plantago* and *Common Plantain* drying after 12 days was 56.3% and 70.0%, respectively. Increasing the dosage resulted in improved desiccation, reaching 58.8–66.7% for *Plantago* and 77.3–85.7% for *Common Plantain* .

In the 2017 research, fields infested during the wheat ripening stage with weeds such as *Field bindweed* (5 plants), *Johnson grass* (32 plants), and *Chenopodium foliosum* (19 plants) were selected for experimentation. When "LiquidXMD" was applied at a rate of 6.0 L/ha, after 12 days, 86.3% of *Field bindweed*, 75.0% of *Johnson grass*, and 60.0% of *Chenopodium foliosum* had dried. Increasing the dosage of this defoliant improved its effectiveness against these weeds.

When "UzDEF" was applied at 6.0 L/ha, *Field bindweed* dried by 84.8%, *Johnson grass* by 76.5%, and *Chenopodium foliosum* by 68.8% after 12 days. With higher dosages, the drying rate reached 87.5–94.4%.

The conducted studies showed that desiccation facilitated the harvesting process. In experiments conducted in the Tashkent region, the control option yielded 50.6 centners/ha of grain and 51.5 centners/ha of straw. When "LiquidXMD" was applied at 6.0 L/ha for weed desiccation, the grain and straw yields increased to 52.6 and 55.2 centners/ha, respectively—an increase of 2.0–3.68 centners/ha compared to the control. The highest results were obtained when "LiquidXMD" was applied at 8.0–9.0 L/ha and "UzDEF" at 7.0–8.0 L/ha (see Table 2).

In fields where desiccation was not carried out, perennial weeds entwined around the wheat ears, leading to grain shedding. Therefore, the primary goal of desiccation is to dry out these weeds and prevent grain loss due to shedding.

Table 2

Effect of desiccation against widespread weeds in winter wheat fields on grain and straw yield (c/ha) under the conditions of Qibray district, Tashkent region, 2015–2017

№	Defoliant name	Application l/ha	Grain yield, c/ha		Straw yield, ts/ha	
			average	difference control	average	difference control
1	Control	-	50,6	-	51,5	-
2	Liquid ХМД	6	52,60	2,00	55,20	3,68
3		7	52,80	2,20	55,30	3,82
4		8	53,00	2,40	55,60	4,08
5		9	52,90	2,30	55,50	3,98
6		10	52,70	2,10	55,30	3,75
7	UzDEF	6	52,80	2,20	55,40	3,87
8		7	53,00	2,40	55,50	4,03
9		8	52,90	2,30	55,50	3,97
10		9	52,80	2,20	55,40	3,88
11		10	52,70	2,10	55,20	3,70

In conclusion, Liquid XMD was more effective against weeds when applied at higher rates, while UzDEF was slightly less effective in comparison.

It can also be concluded that when senication is carried out during the milk-wax ripening phase of winter wheat using 40 kg/ha of ammonium sulfate mineral fertilizer, the chemical composition of the grain improves, with increased grain translucency and gluten content.

References:

1.Teshaev Sh.Zh. Agrarian Sector: Steps of Progress // Uzbekistan Agriculture. – Tashkent, 2015. – No. 9. pp. 2–4.

2.Oripov R.O., Khalilov N.Kh. Botany. – Tashkent, 2007. pp. 73–80.

3.Sheudzhen A.Kh., Akanova N.I., Bondareva T.N. // Agrochemistry. Maykop, 2018. pp. 350–351.

4.Roman'ko Yu.A., Melnik A.V. Yield and Seed Quality of Soybean under Application of Senication and Desication in Conditions of Left-Bank Forest-Steppe of Ukraine // Proceedings of Samara State Agricultural Academy, 2016. – No. 2. pp. 15–18.

5.Methods of Conducting Field Experiments. – Tashkent. UzPITI, 2007. p. 148.

6.Dospehov B.A. Methodology of Field Experiments. – Moscow, 1985. p. 416..