Sulfur in nature and its impact on spiders

Sh.X. Tuxtaev[1], *M.F.* Xayrulloev[1], and *Muyassar* Ochilova[1*]

[1]Bukhara State University, Street Mukhammad Ikbol, 11, 200100 Bukhara, Uzbekistan

Abstract. This article provides information on the sulfur-containing LSD (decoction of sulfuric lime) and externally active substance (EAS) used against cotton spider mites. It has been established that when using these preparations, the Bukhara-6 variety received an additional yield of 4.2-4.4 c/ha with good commercial indicators.

1 Introduction

Agriculture is one of the main industries in Uzbekistan, and during the years of independence, this industry received special attention. The main criteria and norms for the use of harmless chemicals in plant protection have been introduced. Plants need sulfur for normal growth and development. Sulfur is a nutrient along with the elements nitrogen, phosphorus and potassium [1-5].

The constant use of chemicals leads to a sharp decrease in the resistance of the spider mite pest to these drugs and the mass death of beneficial insects. With this in mind, one of the ways is the production and practice of selective preparations based on local raw materials that satisfy the need of plants for sulfur and are highly effective in pest control, the implementation of which is one of the important tasks of our time [6-8].

In modern conditions, the problem of feeding plants with sulfur is one of the most urgent, since most of the sulfur contained in the soil is removed with the harvest, and the rest enters the lower layer of the earth when the soil falls asleep. washed. Sulfur is essential for the growth and development of plants. Compounds such as sulfur, methionine, cysteine and cystine in plants perform various functions and play an important role in their life [1,2].

Sulfur is of great importance in the reactions of oxidation and regeneration occurring in the process of protein metabolism in plants. With its participation, nitrogen is collected from the atmosphere, nodule bacteria are formed.

The annual supply of sulfur with rainwater to a certain level of soil recharge at least slightly provides the problem of the need for this element of agricultural crops. However, a large amount of sulfur is lost every year as a result of sulfur leaching from the soil and crop removal. Due to the insufficient supply of this element to the fields of agricultural crops, such fields need to be replenished with sulfur. Sulfur powder and a decoction of sulfuric lime not only effectively protect crops from spider mites and diseases, but also physiologically speed up the processes at the same time [3-6].

* Corresponding author: m.a.ochilova@buxdu.uz

It is known that sulfur is one of the most widely used and low-toxic drugs in agriculture in our country. Sulfur and some of its compounds simultaneously exhibit insecticidal, acaricidal and fungicidal properties. At first it was used only as sulfur.

It is now widely used as a fungicide and acaricide. However, we do not have complete information about these features. Currently, natural sulfur ores, or ordinary sulfur, are mined from the exhaust gases of plants and factories. In these gases, elemental sulfur is in the vapor state. In Germany, ordinary sulfur is extracted from the gases of metallurgical plants, from the gases of gypsum processing. Today, a large amount of sulfur is produced in Uzbekistan and exported to foreign countries.

2 Simple sulfur

In nature, sulfur occurs mainly in two allotropic forms; rhombic, monoclinic and many other crystalline forms. the specific gravity of the rhombic shape is 2.07, evaporates at 112.8 degrees. Stable at normal temperature, insoluble in water. Poorly soluble in alcohol. monoclinic form during storage becomes rhombic. In addition to rhombic and monoclinic forms, there are also crystalline forms, which are also subdivided into other crystalline forms. Monoclinically disordered sulfur is obtained by cooling rhombic sulfur in the vapor state. At a low temperature of 95.5 0C, it turns into rhombic sulfur. Monoclinic sulfur evaporates at 1190°C.

Relative weight 1.96. This form is resistant to temperatures above 95.50C. Ordinary sulfur is naturally extracted from sulfur deposits and is a natural product. Natural sulfur is found in all parts of the world. It occurs as part of volcanic magmas and as volcanic remains.

In the CIS there are sulfur deposits in the Karakum, Govurdak, Shorsuva, Crimea, the Volga region and other places. The largest reserves of sulfur are located in the US states of Texas and Louisiana, as well as on the Italian islands of Sicily. Previously, it was found that a sulfur preparation is more effective as an insecticide than a crystalline powder. Currently, crushed and sieved powders are sold as insecticides and fungicides. Scientists have found that the effect on conidia of a microscopic fungus depends on how crushed it is. The finer the sulfur powder, the better the effect and the less likely it is to be washed away by rainwater or wind over the leaf of the plant. If the sulfur powder is larger than 27, it will not linger on the leaves or be stored for a long time. Ground sulfur contains up to 35% of particles with a diameter of less than 10, so it is more effective than crystalline sulfur. This form of sulfur is not wettable in water, so when using them, it is recommended to add various additives by spraying.

Sulfur-lime boiling Hydrated and ground sulfur is boiled to form calcium polysulfide, and this liquid is called sulfur-lime boiling. LSD was first recommended in 1833 for hookworm eradication; 4.4 kg of quicklime, 0.27 kg of sulfur filings and 0.11 kg of lamp oil were used. In 1851, a gardener from Otacheria first used lime and sulfur boiled in equal amounts of water. This liquid is called Grison liquid. In the eastern United States, this fluid has been widely used since 1900.

LSD is now sold in many countries and contains 8% to 25% polysulfide and 1% to 4% thiosulfate, with a ratio of polysulfide to monosulfide from 3:1 to 4:1, with a strength of 20-25 (Bome) will. In the US, the best quality LSD sample requires storage of 30-32% calcium polysulfide. Their specific gravity is 1.283-1.925 (32-33 Bome). In Germany, 15-18 g polysulfide in 100 ml LSD must be at least 18.5% and the specific gravity must be 1300.

Experiments have shown that plants cannot obtain a sufficient amount of sulfur from the atmosphere, therefore, in recent years, in different regions of our country, more and more

attention has been paid to determining its amount in the soil and searching for simple forms for farming. Especially in the fields where cotton is sown, due to the lack of combinations of these elements, such lands need to be replenished with sulfur. Thus, there is a great need for sulfur to increase the productivity of crop areas and enhance plant resistance to pests.

When studying aspects of the rational use of sulfur flour and sulfur-lime broth, it was found that they not only effectively protect crops from spider mites, but also accelerate the physiological processes of cotton [9-13].

Many studies have shown that when a 2% suspension of water-borne sulfur is applied to cotton against spider mites, it has a high biological effect against spider mites, while the yield of cotton increases by 3.7-6 centners, and the technological properties of the fiber were also improved.

When using sulfur compounds against pests and diseases, they had a positive effect on the growth and development of many diseases and on productivity [14,15].

In addition, there is information about the positive effect of sulfur on the soil and its ability to accumulate water-soluble nutrients in the soil. Plants treated with sulfur are distinguished by good appearance, green leaves and high productivity. On the contrary, the lack of sulfur in the plant reduces its resistance to low temperatures, drought and disease.

In conclusion, we can say that in the preparation of LSD, the additives introduced into their composition, the duration of boiling and the shelf life are important. If the above norms are observed, it is possible to prepare high-quality LSD [7,8].

Given the above, the spider mite is one of the most dangerous pests that damage cotton. The common spider mite is common in cotton fields, and this pest kills 30-40% of the crop.

F.M. According to Uspensky, if a spider mite gets on cotton in June, it destroys 50-60% of the crop, in July 35-40%, in August 2-6% [9-11,16,17].

Table 1. The action of EAS against the spider mite Farm "Jondor Olimjon Land" in the Khumin microdistrict of the Jondor district of the Bukhara region (2022).

№	Options	Drug concentr a-tion	Average number of spider mites per 100 leaves					Biological effectiveness depending on the days			
			Before proces-sing	days after treatment				5	10	15	20
				5	10	15	20				
1	Externally active substance (EAS)	1%	290	125	92	56	27	37.3	59.8	71.3	78.5
2	Externally active substance	1.5%	281	119	114	41	22	39.9	48.4	76.6	82.6
3	Externally active substance	2%	596	127	166	67	28	68.8	65.2	83.2	89.1
4	LSD comparative	1%	267	95	120	156	-	46.6	43.2	13.1	-
5	Control with water	-	318	212	255	214	138	-	-	-	-

In subsequent years, these figures average 10-12%, since the most dangerous pests multiply rapidly and their harmfulness increases excessively, it is necessary to look for measures to combat it. With this in mind, experiments on cotton were carried out in four repetitions in one variant, which consisted of the following options: 1. EAS (1, 1.5% and 2%), 2. LSD sulfur with lime (1% boma).) (comparative) 600 l/ha when sprayed with 3 test waters. Spider mites and other pests are taken into account on the lower, middle and upper leaves of each plant taken in the experiment. The experiment was carried out on July 19, 2022, during the fruiting period of cotton. To find out how long the effect of the drug lasts, spider mites are counted every 5 days. Table 1 shows the average effect of EAS against spider mites in the field. The most effective 2% liquid concentrate, compared with other options, the efficiency of 89.1% was noted after 20 days, especially when spraying, the highest biological effectiveness of sulfur EAS against spider mites is enough 2% , after 15 days when sprayed with the same 1% biological efficiency is 71.3% and 1.5% after spraying and 76.6%.

3 Results

The results of the comparator and control options are presented in Table 1. "Jondor Olimjon land economy" (2022) in the Khumin microdistrict of the Jondor district of the Bukhara region.

Table 2. Farm "Jondor Olimjon Land" in the Khumin microdistrict of the Jondor district of the Bukhara region (2022).

№	Options	Working fluid rate	Theft 1 crotch	Number of pods per plant	Number of plants	Cotton output	The rate of consumed drugs	Additi-onal
1	Sulfur (EAS) 1%	400	4.3	7.0	98.9	29.7	4	1.8
2	Sulfur (EAS) 1.5%	400	4.4	7.2	100.2	31.0	6	3.1
3	Sulfur (EAS) 2%	400	4.8	6.7	99.7	32.3	9	4.4
4	Comparative LSD (1% bome)	400	4.8	6.8	98.9	32.1	1	4.2
5	Control (with water)	400	4.0	6.9	101.0	27.9	-	-

It was revealed that the difference in the yield of cotton with sulphurous EAS was 29.7-32.3 tons, and the surplus yield was 1.8-4.4 tons. So, from modern chemical preparations, EAS sulfur is considered an effective drug in the fight against spider mites, and when spraying with a tractor, the effect of poisoning with a working fluid with a concentration of 400 l / ha reaches 25 on the 25th day, and it is of better quality than gray-lime decoction

(LSD), so for production we recommend spraying with a 2% suspension of sulphurous EAS with a working fluid of 400 l/ha, this preparation is harmless and cost-effective.

The effectiveness of lime broth of sulfur is based on the decomposition of polysulfites on the outer surface of the plant under the influence of carbon dioxide and oxygen in the air, and the formation of finely dispersed sulfur with fungicidal and acaricidal activity [18,19].

Table 3. It is advisable to use the following table to dilute the initial (dark) decoction of LSD to prepare a liquid solution of a certain level.

The main decoction is a concentration of LSD		**At the following power (level) 100 l to prepare a liquid solution the main decoction to be obtained quantity (l)**		**The main decoction is a concentration of LSD**		**At the following power (level) 100 l to prepare a liquid solution removable the main decoction quantity (l)**	
Density by densimeter	**Bome according to (level) power (level)**	**0,5°**	**1°**	**Density by densimeter**	**Bome according to (level)**	**0,5°**	**1°**
1.100	13	3.50	7.0	1.190	23	1.80	3.6
1.108	14	3.25	6.5	1.200	24	1.75	3.5
1.116	15	3.00	6.0	1.210	25	1.65	3.3
1.125	16	2.80	5.6	1.220	26	1.60	3.2
1.134	17	2.60	5.2	1.230	27	1.50	3.0
1.143	18	2.45	4.9	1.241	28	1.44	2.9
1.152	19	2.30	4.6	1.252	29	1.40	2.8
1.161	20	2.15	4.3	1.263	30	1.30	2.6
1.170	21	2.05	4.1	1.274	31	1.25	2.5
1.180	22	1.90	3.8	1.285	32	1.20	2.4

The amount of water added to the broth to create a working solution is determined by the following formula.

$$X = \frac{a - в}{B}$$

Here: X-1 part is the amount of water to be added to the mother broth, l
a-concentration of mother broth;
v-concentration of the working solution.

4 Conclusion

Thus, it can be said that in the preparation of sulfur-containing LSD and EAS, the duration of boiling and the shelf life of the additives introduced into their composition are of great importance. LSD and EAS quality can be prepared by following the above standards.

References

1. B. Muhammadiev, Sh. Tukhtaev, Agroscience **4,** 53-54 (2021)
2. A.Sh. Khamroev, et. al., Golden match and harvest (peasant notebook) pp. 3-7 (Uzbekistan, 1984)
3. F. Ganieva, Sh. Tukhtaev, Kotoran 80% SP against turnip moths (Center for Scientific Publications, buhdu.an, 2021)
4. F. Ganieva, Sh. Tukhtaev, Influence of methods of cultivation of cotton in the Bukhara region on the reduction of damage to plants by turnip moths (Center for Scientific Publications, buhdu.an, 2021)
5. A.Sh. Khamroev, et. al., Recommendations for the use of sulfur fertilizers for agricultural crops and against diseases (Tashkent, 2007)
6. F.M. Uspensky, Moscow magazine "Khlopokodstvo" **2,** 25-30 (1975)
7. Ya. Yakhontov, Agricultural pests of Central Asia and measures to combat them (Tashkent, "Uzbekistan", 1962)
8. Sh.Kh. Tokhtaev, S.F.M. efficiency of new application forms of preservative sulfur. Ecological problems of flora and fauna of the Bukhara region (BukhSU publishing house, 1997)
9. Sh.Kh. Tukhtaev, *Efficiency of the SPM preservative in the application of sulfur against the cotton mites*. Collection of scientific proverbs of talented students and teachers of the Faculty of Agriculture (Bukhara, 2002)
10. Sh.Kh. Tukhtaev, R. Yunusov, *The effectiveness of pesticides against spider mites on cotton grown in the Bukhara region.* Scientific information of Bukhara University 3-4 (Bukhara, 2002)
11. Sh.Kh. Tukhtaev, et. al., *A new way to control powdery mildew on grape plants in the conditions of the Bukhara region.* Materials of the scientific-practical conference "Achievements of science and prospects for the development of agriculture" (Samarkand, 2006)
12. S.S. Khodzhiev, N.Sh. Enileev, Sh.Sh. Nafetdinov, N.N. Toraeva, G.Yu. Nematova, *Influence of root types and peach placement patterns on yield and chemical composition of fruits.* RSCB Annals **25(3),** 3199 – 3207 (2021)
13. B.S. Boltaev, The effectiveness of new preparative forms of the series against spider mites on cotton Diss.k.s.kh.n. (M., 1998)
14. A.Sh. Khamroev, N. Toshmatov, O. Vdovina, Agriculture of Uzbekistan **9,** 26-27 (1984)
15. Sh. Tokhtayev, F. Ganiyeva, "Harmful organisms of the main crops of agriculture and methods of biological control against them" methodical guide (BukhSU "Sharq Bukhara" publishing house, 2020)
16. Ya. Yakhontov, Central Asian agricultural pests and measures to combat them (Tashkent, "Uzbekistan", 1962)
17. F.M. Uspenisky, Moscow, Magazine "Cotton" **2,** 25-30 (1975)
18. F.M. Uspenisky, Common spider mite in irrigated regions of Central Asia (Publishing House of the Academy of Agricultural Sciences of Uzbekistan, Tashkent, 1996)
19. S.N. Alimukhammedov, Moscow, magazine "Zashchita rastenyi" **2,** 25-30 (1983)