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FOREIGN TECHNOLOGY DIVISION



A DEFOLIANT

by

A. N. Kasikhin, D. A. Musikayev, et al.

OCT 27 1970



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EDITED TRANSLATION

A DEFOLIANT

By: A. N. Kasikhin, D. A. Musikayev, et al.

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Date 8 Aug. 1970

A DEFOLIANT

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The invention relates to chemical means for removing leaves and for stimulating the ripening of a crop and increasing its quality.

Many defoliants used at the present time cause the leaves to fall off only after 12-17 days, and in the case of decreased temperatures, 20-25 days.

With such an extended defoliation process some of the leaves are left on the plant stalks, which subsequently impairs mechanized harvesting.

The defoliation process should cause a complete drop of the leaves and should also occur at high speed and with a mild physiological action. Harsh action of defoliants causes the appearance of brownish spots or even necroses on the leaves. In this case many leaves do not fall, which impedes harvesting of the crop.

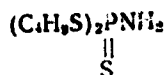
Such highly effective preparations such as butyfos* ["Butyphos"?] and Folex have obtained wide application in cotton growing, but in

*Translator's Note: This term could not be found from available written sources and is assumed to be a brand name.

other cultures they are of little effect.

The purpose of the invention is to create preparations which would possess speed and mildness of physiological action and would display high activity under any appropriate conditions on various crops.

Aminotrithiophosphates which display a high defoliation capability have been developed and studied. Of the number of preparations tested, S,S-dibutylaminotrithiophosphate, which has the following chemical structure:



proved especially effective.

The S,S-dialkylaminotrithiophosphates are readily available compounds which are obtained from ammonia and dialkyltrithiochlorophosphates. The latter are also obtained from thiotrichlorophosphates and mercaptans with good S,S,S,-tributyltrithiophosphate (butifos), since the consumption of the expensive mercaptan for its synthesis is reduced almost one third. () ←

Example 1. Laboratory tests were made under greenhouse conditions on bean plants (the Saks* [Sax?] strain) and soybean plants (Primorskaya 529). The plants grew in clay pots (15 cm in diameter) in a mixture of soddy and humus soil (1:1). After thinning three identical plants were left in each pot. Aqueous solutions or emulsions of defoliants were applied to the plants by means of a sprayer at a calculated rate of 500 l per hectare of the working solution at the moment of emergence of the three-leafed nodule (0.5-1 cm), budding, or blossoming. The experiments were repeated four times. The effectiveness of the defoliation was determined from the difference between the number of leaves at the time of treatment and from 3, 7, or 10 days later. Preparations of

*Translator's Note: This term unidentified.

butyfos and Folex were used as the standard defoliants. In all cases the dose was calculated and concentrated in terms of the active material.

An experiment with beans under greenhouse conditions (Table 1) showed the presence of a high defoliating activity in the S,S-dibutylaminotrithiophosphate.

In subsequent experiments when S,S-dibutylaminotrithiophosphate was tested on bean plants (in the budding and blossoming phase) and on soybean plants (in the phases of blossoming and yellowing of beans) it also manifested high defoliating activity (Tables 2 and 3).

It is characteristic that the high defoliation activity of dibutylaminotrithiophosphate was especially manifest with treatment in the yellowing phase of the beans, i.e., at the moment it is recommended that soybeans be treated with defoliants without the risk of causing a crop reduction.

Table 1. Deforming activity of S,S-dibutylaminotrithiophosphate during treatment of bean plants in phase of emergence of the bud of the first ternate leaf (vegetation experiment).

Preparation	Leaf drops in 7 days vs. preparation concentration, %	
	0,3	0,6
S,S-dibutylaminotrithiophosphat.	10	40
Butyfos	0	10
Folex	20	60

Example 2. Tests were made on field plots 1 m² in area when the soybeans were planted three times (the Primorskaya 529 strain). Aqueous solutions and emulsions of defoliant were applied by a hand sprayer at a calculated rate of 500 l per hectare of the working solution. The results of the field experiment (see Table 4)* also give evidence of the high defoliation activity of S,S-dibutylaminotrithiophosphate (1.5-3 kg per hectare) on soybean plants.

*Table 4 missing from original.

Table 2. Defoliating activity of S,S-dibutylaminotrithiophosphate during treatment of bean plants in the budding and blossoming phases (vegetation experiment).

Preparation	Concentration, %	Leaf drop (in %) after				
		budling days		blossoming days		
		7	10	4	7	10
1. S,S-dibutylaminotrithiophosphate	0.15	—	—	—	0	10
	0.3	40	40	—	10	30
	0.45	—	—	30	40	40
	0.6	70	70	40	40	50
2. butyfos	0.25	—	—	0	0	0
	0.3	30	40	0	0	10
	0.45	—	—	0	10	20
	0.6	40	50	0	10	20
3. Folex	0.15	—	—	—	10	30
	0.3	60	70	—	20	50
	0.45	—	—	80	20	50
	0.6	70	90	100	100	100

Table 3. Defoliating activity of S,S-dibutylaminotrithiophosphate during treatment of soybean plants in the blossoming phase and in the phase of yellowing of the beans (vegetation experiment).

Preparation	Concentration in %	Leaf drop (in %) in 5 days treatment of soybeans in the phase of	
		blossoming	yellowing of beans
S,S-dibutylaminotrithiophosphate	0.25	60	80
	0.5	100	100
Butyfos	0.25	10	40
	0.5	60	60
Folex	0.25	40	40
	0.5	60	80

It should be noted that the given preparation has the properties of a gently acting defoliant. In all cases after treatment of plants with it the young leaves fell green, and the old leaves fell after some yellowing in a manner similar to natural dropping. No blights or necroses of the leaves during treatment with S,S-dibutylaminotrithiophosphate were noted.

Tests of S,S-dibutylaminotrithiophosphate on American jutes also confirmed its high defoliation activity. In experiments on cotton, S,S-dibutylaminotrithiophosphate revealed no advantages over Butifos and Folex.

Object of the Invention

The use of S,S-dialkylaminotrithiophosphates, for example, S,S-dibutylaminotrithiophosphate of the structure $(C_4H_9S)_2PNH_2$ as a defoliant.

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CORRECTION

ERRATUM TO FTD-HT-23-378-70

Paragraph 3 on page 2 should read as follows:

The S,S-dialkylaminotrithiophosphates are readily available compounds which are obtained from ammonia and dialkyltrithiochlorophosphates. The latter are also obtained from thiotrichlorophosphates and mercaptans with good yield. Consequently, dibutylaminotrithiophosphate should be less expensive than S,S,S-tributyltrithiophosphate (butyfos), since the consumption of the expensive mercaptan for its synthesis is reduced almost one third.