

## ACRIDINE SUBSTITUTED [1,2,4]-DITHIAZOLIDINES : A POTENT LARVICIDAL AND SEED GERMINATION PROMOTING AGENT

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### ABSTRACT

The series of acridine substituted [1,2,4]-dithiazolidines have been studied for their larvicidal and seed germination promoting activity. The title compounds were prepared by interaction of 1-acridin-9-yl-3-phenyl thiourea with N-phenyl-S-chloroisoithiocarbamoyl chloride by grinding method. The structures compounds were confirm on the basis of TLC and IR spectral study. The larvicidal properties were checked against mosquito larvae by taking several dilutions method mortality rate is recorded. Seed germination promoting activity of the test compounds solutions were studied using wheat grains and results clearly revealed that these compounds may acts as a seed germination promoter.

**Keywords:** [1,2,4]-dithiazolidines, larvicidal property, seed germination promoting activity.

### MATERIAL AND METHOD

#### INTRODUCTION

Structural properties and various activities of dithiazolidines have been reported<sup>1-3</sup> and enriched with progressive finding about the synthesis of [1,2,4]-dithiazolidines<sup>4-6</sup>. The [1,2,4]-dithiazolidines have been found to possess potent anti-tumour, anti-tuberculosis anti-cancer, and anti-diabetic properties<sup>7-10</sup>. Chemical compounds such as larvicides may acts as insecticides are claimed to be a major factor behind the increase in the agricultural productivity. Nearly all insecticides and larvicides have the potential to significantly alter ecosystems<sup>11</sup>.

Many of the major larvicides are inspired by chemical compounds exhibiting bio-activity and one among those is [1,2,4]-dithiazolidine, which has been extensively evaluated in this article<sup>12</sup>. Mosquitoes are one of the deadliest insects in this planet which create biting nuisance and also transmit deadly diseases like malaria, filariasis, yellow fever, dengue, chikungunya and Japanese encephalitis etc. Therefore we made an attempt to utilize these [1,2,4]-dithiazolidines linked with acridine for their larvicidal activity.

The ability of [1,2,4]-dithiazolidines linked with acridine to act as a germination cue in many species has led to widespread interest in this aspect of seed biology. Here, we report the action of these compounds as effective seed germination promoting agents. The purpose of this brief study is an attempt to characterize the regulatory mechanism of seed germination in wheat grains<sup>13</sup>.

The melting points of all synthesized compounds were recorded using hot paraffin- bath and are uncorrected. Chemicals used were of A.R. grade. The IR spectra recorded on Perkin-Elmer spectrophotometer in the range 4000-400cm<sup>-1</sup> in nujol mull and as KBrpellete. Purity of the compounds was checked on silica gel-G plates by TLC.

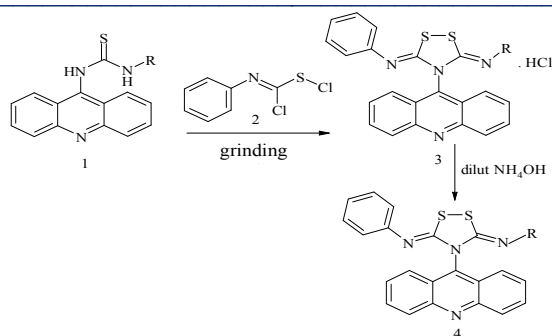
4-acridin-9-yl-3,5-bis-phenylimino-[1,2,4]-dithiazolidine (4a): (Found: C, 68.12; N, 11.28; S, 6.98. Calcd. for C<sub>27</sub>H<sub>18</sub>N<sub>4</sub>S<sub>2</sub>: C, 70.12; N, 12.12; S, 7.14%) ;IR : 1550, 1342, 758, 483cm<sup>-1</sup> (S-S)

4-acridin-9-yl-3-phenylimino-5-o-tolylimino-[1,2,4]-dithiazolidine (4b) : (Found: C, 66.91; N, 11.68; S, 12.40. Calcd. for C<sub>28</sub>H<sub>20</sub>N<sub>4</sub>S<sub>2</sub>: C, 70.58; N, 11.76; S, 13.44%); IR: 1538, 1332, 763, 458cm<sup>-1</sup>.

4-acridin-9-yl-3-phenylimino-5-m-tolylimino-[1,2,4]-dithiazolidine (4c) : (Found: C, 70.18; N, 11.70 S, 13.21 Calcd for C<sub>28</sub>H<sub>20</sub>N<sub>4</sub>S<sub>2</sub>: C, 70.58; N, 11.76; S, 13.44%); IR : 1550, 1338, 755, 470 cm<sup>-1</sup>.

4-acridin-9-yl-3-phenylimino-5-p-tolylimino-[1,2,4]-dithiazolidine (4d) : (Found: C, 66.13; N, 10.89; S, 12.55. Calcd. for C<sub>28</sub>H<sub>20</sub>N<sub>4</sub>S<sub>2</sub>: C, 70.58; N, 11.76; S, 13.44%); IR : 1533, 1332, 760, 458 cm<sup>-1</sup>.

4-acridin-9-yl-3-(2-chlorophenylimino)-5-phenylimino-[1,2,4]-dithiazolidine(4e) : (Found: C, 64.93; N, 11.18; S, 13.47. Calcd. for C<sub>27</sub>H<sub>17</sub>N<sub>4</sub>S<sub>2</sub>Cl : C, 65.32; N, 11.29; S, 12.90%) ; IR : 1550, 1338, 764, 483 cm<sup>-1</sup>.



## LARVICIDAL ACTIVITY

Larvicidal activity for the title compounds was checked by preparing the stock solutions by making up the volume of 0.02M concentration in 100mL distilled water. Slightly warm water was used for preparing the several series of dilutions of 10mL, 30mL, 50mL, 70mL and 100mL to check the toxicity of the compounds in distilled water. 5mL of the dilutions were taken in 50mL of the water containing mosquito larvae used as the test organisms. The setup was kept as it is for a period of 24hrs and the results were recorded the following day. As per the results, the compound 4-acridin-9-yl-3-(2-chlorophenylimino)-5-phenylimino-[1,2,4]-dithiazolidine (4e) was found to possess maximum larvicidal activity as compared to the other compounds.

Compounds	4a			4b			4c			4e			4d		
Dilutions	10	30	50	10	30	50	10	30	50	10	30	50	10	30	50
Mortality Rate %	6	30	20	50	20	20	40	30	10	40	30	20	80	60	50

## SEED GERMINATION PROMOTING ACTIVITY

Seed germination promoting activity was studied by preparing serial dilutions of the compounds of 10mL, 30mL, 50mL, 70mL, 100mL concentrations and wheat grains were treated with 1mL of test compound solution and then soaked in water for 24 hr. and the result obtained were clearly indicated that 4-acridin-9-yl-3,5-bis-phenylimino-

[1,2,4]-dithiazolidine (4a) shown maximum promoting activity. Average promoting activity of the compounds (4a-e) was also recorded.

Compounds	Dilutions in ml					Promoting Activity %
	10	30	50	70	100	
4a	+++	+++	+	++++	+++++	80
4b	++	+	+	+++	++	50
4c	-	-	-	+	++	40
4d	+++	+	-	-	++	40
4e	++	+	-	+++	+++	60

## RESULT AND DISCUSSION

Several 4-acridin-9-yl-3,5-bis-arylimino-[1,2,4]-dithiazolidines (4a-e) were studied for their larvicidal and seed germination promoting activity. As a potent larvicidal agent, the compound 4-acridin-9-yl-3-(2-chlorophenylimino)-5-phenylimino-[1,2,4]-dithiazolidine (4e) exhibited the maximum mortality rate of 80% and 60% for the 10ml and 30ml dilutions respectively. The compound 4-acridin-9-yl-3,5-bis-phenylimino-[1,2,4]-dithiazolidine (4a) was found to possess a remarkable seed germination promoting activity as compared to the other compounds. Beside this, mild reaction conditions, grinding technique, easy work-up procedures and the reaction carried out in catalyst free conditions are the merits of the route.

## CONCLUSION

The larvicidal properties of 4-acridin-9-yl-3,5-bis-arylimino-[1,2,4]-dithiazolidines (4a-e) were checked against mosquito larvae by taking several dilutions and some of them found to be highly active with maximum mortality rate of 80%. Seed germination promoting activity of the test compounds solutions were studied against wheat grains and results clearly revealed that these compounds may act as a good seed germination promoter.

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