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# VEGETATIVE AND REPRODUCTIVE RESPONSES OF WHEAT TO SUCCINIC ACID, 2,2-DIMETHYL HYDRAZIDE (ALAR)

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Wheat seeds, cv.SA-75, were treated with 4 concentrations, 2000, 2500, 3000 and 3500 ppm succinic acid 2, 2-dimethyl hydrazide (Alar). Their subsequent growth in field plots was investigated from 8 harvests taken at fortnightly intervals from Jan. 5 to April 15. Alar depressed plant height and reduced leaf area equally at all concentrations but had no effect on leaf number or dry weight of roots, shoots or of grain. The number of grains per spike, length of spike and number of spikelets per spike were increased at 2000 ppm but there was no effect of treatment of grain yield.

***Key words***: Wheat seeds, Succinic acid, 2, 2-Dimethyl hydrazine.

## Introduction

The use of plant growth regulating substances is becoming popular. The use of chemicals to suppress the growth of plants is a recent development. Chemical growth regulators are known to effect the morphological and physiological changes in plants. Succinic acid, 2, 2-dimethyl hydrazide (Alar) as one of the growth regulators applied in various ways to a number of plant species. This chemical reduces or retards the shoot or plant growth of wheat [1] and increases the number of tillers, number of grains per ear, and grain yield of barley [2]. The high nutritive value of wheat (*Triticum aestivum* L.) makes it important for human and animal diet. There is therefore, a great need to increase the yield of this cereal crop by the treatment of alar. The effect of alar on *Triticum aestivum* plant does not appear to have been studied. The present paper therefore, reports the growth and yield responses of seeds of *T. aestivum* to alar treatment.

## Materials and Methods

Wheat seed, cv. SA-75 were soaked in distilled water, 2000, 2500, 3000 and 3500 ppm alar for 24 hrs. The soaked seeds were then sown in the field. A randomized complete block design was used with 4 replications. The size of the individual plot was 5' x 8' and row to row distance was 10". The growth was investigated from eight harvests taken at fortnightly intervals. At each harvest, three plants from each treatment were harvested at random and data on growth parameters were recorded. Ten plants per treatment were earmarked to record the length of spike, number spikelets per spike, number of grains per spike, 1000- grain weight and grain yield. The data were analysed statistically and the treatments were compared by the Duncan's new multiple range test [3].

## Results and Discussion

Application of alar depressed the plant height significantly at all concentrations used. The difference among treated plants were non-significant (Table 1 & 2). Mehrotra *et al.* [1], Rasoul *et. al.*[4], Petr and Hradecka [2] and Marsh *et al.* [5] also reported similar results. They also recorded decrease in the plant height of wheat, maize, barley and okra, respectively with the application of alar. Alar treatments decreased the leaf area equally at all the concentrations in the present investigation. Reduction in the leaf area of okra and rice was also reported by Marsh *et al.* [5] and Tschen and Shih [6] respectively. The data of the present investigation revealed that the number of nodes and internodes, leaves and dry weight of root and shoot were not significantly influenced by the treatment. These results are contrary to the findings of Mehrotra *et al.*[1] and Rasoul *et al.* [4]. They reported that alar decreased the plant dry matter production of wheat and maize respectively. As far as the effect of alar on yield components is concerned it increased the spike length, number of spikelets per spike and number of kernels per spike but the yield was not significantly influenced by the treatments. 2000 and 3500 ppm alar treated plant significantly increased the spike length, 2000, 2500 and 3500 ppm increased the number of spikelets per spike and 2000 ppm number of kernels per spike as is clear from the data presented in Table 3. These results are in accordance with the findings of Petr and Hradecka [2]. They also reported increase in number of ears, spikelets per ear and number of kernels per ear of barley.

Yield was not influenced by the application of alar in the present investigation. These results agree with the findings of Mehrotra *et al.*[1] and Marsh *et al.* [5] who reported that yield of wheat and okra was not significantly effected by the alar treatment. Mehrotra *et al.*[1] further reported that flowering and maturity was delayed and grain protein contents of wheat were increased. The results are contrary to the findings of Rasoul *et al.* [4]. They reported that grain yield of maize declined with water stress irrespective of the growth regulator application but alar reduced the magnitude of this decrease particularly at the highest concentration. Whereas, Petr and

TABLE 1. EFFECT OF ALAR ON VEGETATIVE CHARACTERS OF WHEAT (*TRITICUM AESTIVUM* L.).

| Characters | Treatment (ppm) | $H_1$ | $H_2$ | $H_3$ | $H_4$ | $H_5$ | $H_6$ | $H_7$ | $H_8$ |
|---|---|---|---|---|---|---|---|---|---|
| Height of plant | Control | 4.50a | 6.16a | 12.60a | 22.50a | 38.30a | 61.55a | 60.20b | 64.80a |
| (cm) | 2000 | 3.18a | 5.30a | 11.05a | 17.20c | 31.13c | 51.95c | 54.83c | 55.98c |
| | 2500 | 3.55a | 5.60a | 12.28a | 21.00a | 35.00a | 57.35b | 57.83b | 61.00b |
| | 3000 | 3.75a | 5.65a | 13.75a | 19.95a | 39.98a | 60.60a | 63.45a | 63.55a |
| | 3500 | 3.30a | 5.38a | 11.98a | 18.40b | 29.70c | 55.38b | 56.40c | 57.70c |
| Leaf area | Control | 2.72a | 4.92a | 9.63a | 13.17a | 12.48a | 11.15a | 12.47a | 12.02a |
| | 2000 | 2.46a | 4.73a | 9.40a | 10.37b | 11.86a | 10.85a | 11.58a | 11.15a |
| | 2500 | 2.57a | 4.38a | 9.74a | 10.59b | 11.52a | 11.09a | 12.30a | 11.57a |
| | 3000 | 2.60a | 4.80a | 9.58a | 10.84b | 11.66a | 11.27a | 12.13a | 11.77a |
| | 3500 | 2.52a | 4.50a | 8.83a | 11.14ab | 12.13a | 11.02a | 11.76a | 11.36a |

TABLE 2. TREATMENT MEANS.

| Alar concentration ppm | Plant height (cm) | Number of nodes | Number of internodes | Number of leaves | Leaf area (cm.sq.) | Shoot dry weight (gm) | Root dry weight (gm) |
|---|---|---|---|---|---|---|---|
| 0 | 34.47a | 3.97ab | 2.97ab | 3.97ab | 9.81a | 2.7140a | 0.4036a |
| 2000 | 28.65b | 3.84b | 2.84b | 3.84b | 9.06a | 2.7072a | 0.3987a |
| 2500 | 31.57b | 4.06a | 3.06a | 4.06a | 9.22a | 2.7105a | 0.4029a |
| 3000 | 33.23b | 3.94ab | 2.94ab | 3.94ab | 9.33a | 2.7209a | 0.4027a |
| 3500 | 29.95b | 4.00a | 3.00ab | 4.00a | 9.16a | 2.7100a | 0.4022a |

Means with a common letter are not significantly at P<0.05

TABLE 3. EFFECT OF ALAR ON YIELD COMPONENTS OF *TRITICUM AESTIVUM* L.

| Treatment (ppm) | Length of spike (cm) | No. of spikelets per spike | No. of Kernels per spike | 1000-Grain weight(gm) | Total grain yield per plot. (gm) |
|---|---|---|---|---|---|
| Control | 10.73 cd | 20.50 c | 59.00 b | 42.30 ab | 489.60 ab |
| 2000 | 11.63 a | 22.25 a | 67.00 a | 43.42 a | 517.55 a |
| 2500 | 10.93 c | 21.25 b | 63.50 ab | 40.70 bc | 463.58 ab |
| 3000 | 10.45 d | 20.25 c | 57.25 b | 40.15 c | 434.70 b |
| 3500 | 11.28 b | 21.75 ab | 64.75 ab | 41.02 bc | 456.28 ab |

Means with same alphabet are not significantly different at P<0.05.

Hradecka [2] observed increase in the grain yield of barley by the application of alar.

It can be safely concluded that the data of the present investigation reveal that alar was relatively in-effective in altering the growth pattern of wheat plant. The results agree with the findings of Mehrotra *et al.* [1] and Marsh *et al.* [5]. They reported that difference found among responses to the various concentrations of B-nine was non-significant. These differences may be due to the difference in dosage, method of application and sensitivity of the experimental material to alar.

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