# EFFECTS OF ALLOPURINOL TREATMENT IN SUPPRESSING HYPERSENSITIVE REACTION IN A LINE WITH LESION MIMIC GENE IN WHEAT.

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## INTRODUCTION

- Lesion mimics produce flecks that resemble symptoms of diseases in the absence of pathogen infection.
- Lesion mimic symptoms vary in their range from hypersensitive-reaction like spotting to large chlorotic or in some instances necrotic lesions.
- Lesion mimics have been documented to confer some resistance to different diseases in plant species like in rice, barley, corn, wheat and Arabidopsis.
- Lesion mimic mutants use HR mechanism in conferring resistance during the adult stage even in the absence of the disease. This may negatively affect the partitioning of energy resources at the expense of reproductive development of the plant.

## OBJECTIVES

- To evaluate the effectiveness Allopurinol in reducing HR -like responses in lesion mimic line.
- To evaluate the effects of allopurinol treatment on grain yield , number, chlorotic area and chlorophyll content.

## MATERIALS AND METHODS

- **Genotypes:** Alsen a cultivar grown commercially and Ning7840 that has a lesion mimic gene were lines used in the study.
- **Design:** A factorial experiment laid in a randomized complete block design with three replicates was implemented in a greenhouse. Three allopurinol levels were 75µm, 50µm and 25µm with no allopurinol chemical as a control. Plants were planted in 1L pots and were placed in plates to collect excess drainage from pots.
- **Data collected:** A camera was used to capture pictures for necrotic spots in the flag leaf placed on a white light box. ASSESS 2.0 package was used to quantify necrotic lesion data. Furthermore, yield and yield components data was collected at harvest.
- **Data analyzed:** Analyses were performed using SAS 9.1 package

**Fig. 1**. Experimental set up in the greenhouse , chlorotic spots on a Ning7840 , Spadmeter & White light box

## RESULTS

**Table 1**. Probability values for Type I error grain weight and number, chlorophyll content and leaf chlorotic area , genotype, Allopurinol treatment level and genotype X Allopurinol treatment from the GLM for ANOVA and ANCOVA.

| | | *P-values* | | | |
|---|---|---|---|---|---|
| Source | Df | Grain yield (g) | Grain number | Chlorophyll content | Chlorotic area (mm sq.) |
| Genotype | 1 | <0.0000*** | 0.0004*** | 0.0254* | 0.0007*** |
| Treatment | 3 | 0.0363*** | 0.0500* | 0.7315ns | 0.002** |
| Gen*Treat | 3 | 0.0437* | 0.0412* | 0.0155* | 0.397ns |
| Covariate | 1 | NA | NA | NA | <0.0001*** |

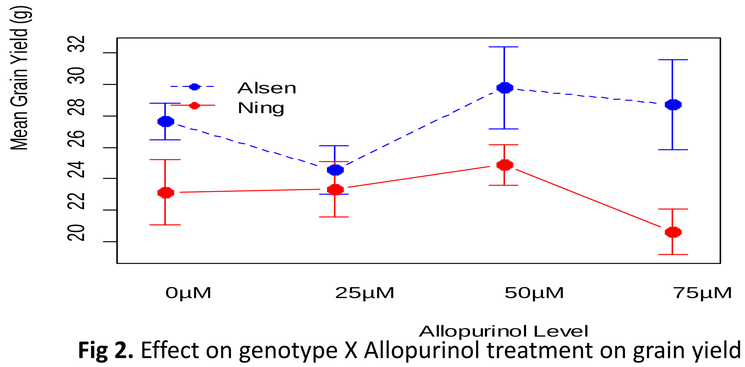


**Fig 2.** Effect on genotype X Allopurinol treatment on grain yield

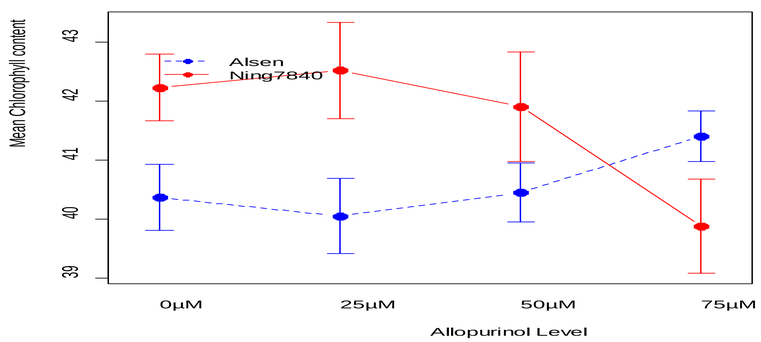


**Fig 3.** Effect of genotype X Allopurinol treatment on chlorophyll content

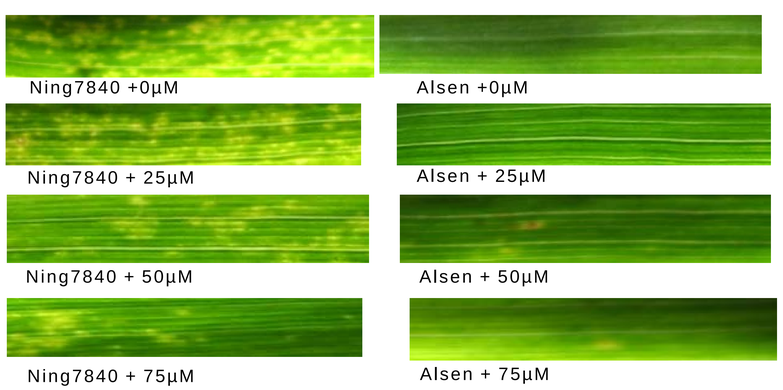


**Fig4.** Chlorotic spots on genotypes under different Allopurinol treatment levels

**Table 2.** Effect of Allopurinol treatment and genotype on leaf necrosis and grain number

| Allopurinol level | Mean chlorotic area (mm sq.) | Mean grain number |
|---|---|---|
| 0µM | 4894.8a | 816ab |
| 25µM | 3867.3b | 785b |
| 50µM | 2267.9c | 886a |
| 75µM | 1847.6c | 805b |
| LSD | 544 | 76 |
| Genotype | Mean chlorotic area (mm sq.) | Mean grain number |
| Alsen | 66.6b | 782b |
| Ning7840 | 6372.2a | 864a |
| LSD | 384 | 53 |

## SUMMARY

- Genotypic and Allopurinol treatment effects on differences on mean grain yield, grain number and chlorophyll content depended on Allopurinol level (Table 1 and Figs. 2 &3).
- Allopurinol treatment differences were highly significant for grain yield, grain number and chlorotic area (Tables 1 & 2).
- Genotypic differences were highly significant for grain yield, grain number, chlorophyll content and chlorotic area (Tables 1 & 2, Fig. 4).
- Highest genotypic mean grain yield and grain number were attained when the Allopurinol level was50µM (Figs2 &Table 2). Lowest chlorotic area was achieved at 75µM and Alsen gave the least level of chlorotic area (Table 2 and Fig. 4).
- Chlorophyll content was higher in Ning7840 than Alsen across the Allopurinol levels up to 50µM, beyond 50µM it negatively and positively affected the chlorophyll content in Ning7840 and Alsen respectively(Fig. 3).

## REFERENCES

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