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# Management of Leaf Spot/Blight of *Heliconia* Caused by *[Drechslera* State of *Trichometasphaeria holmii]* Using Fungicides

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**Fifteen fungicides of four different categories *viz.*, six systemic, four non-systemic, two antibiotics and three mixed formulation and their three concentrations were tested *in vitro* for their efficacy against *Drechslera* state of *Trichometasphaeria holmii* by poisoned food technique. All the fungicides evaluated significantly reduced the growth of the pathogen as compared to control but all the fungicides and their concentrations significantly differed within themselves. The higher concentration of each fungicide produced maximum growth inhibition of the pathogen. Among the different fungicides tested, propiconazole (Tilt 25% EC), tricyclazole (Beam 75 %WP), tridemorph (Calixin 80 % EC) from systemic group, copper oxychloride (Blitox 50%WP) and MEMC (Emisan 6% WP) from non systemic group, kasugamycin (Kasu-B 3% L) from antibiotics, carbendazim 25 % + ipridione 27 % (Quintal 50 % WP) and carbendazim 25 % + mancozeb 27 %(Sixer 75 %WP) from mixed formulations completely inhibited growth of the pathogen and proved to be highly fungitoxic to *Drechslera* state of *Trichometasphaeria holmii.***

**Key words:** *Drechslera* state of *Trichometasphaeria holmii,* Leaf spot/ blight, Fungicides, *Heliconia.*

Flowers occupy an important place in Indian society, often symbolic of beauty, love and tranquility (Gajanan & Sudha, 2006)[1]. Heliconias are gaining importance and became popular among the florists and plant lovers almost round the world due to their diversity in both colour and form, and have good potential as commercial cut flower. Its brilliant colour, exotic form, long straight peduncles and excellent post harvest characteristics which make it an outstanding flower for the florists trade (Janakiram & Kumar, 2011)[2]. The art of growing and using *Heliconia* as ornamentals in our country is still in the initial stages of development. Under the Indian sub-tropical climatic conditions, *Heliconia* perform satisfactorily in partial shade generally in ground planting (Goel, 2004)[3]. The tropical, humid and heavy rainfall region of South Gujarat and medium black soils are suitable for cultivation of *Heliconia* and the crop has a tremendous potential as it can grow well under

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open as well as partial shady conditions of coconut and sapota orchards. Out of various factors responsible for successful growing of *Heliconia*, disease management is one of the most important factors and as the crop is newly introduce in India, not much research work is done. *Heliconia* is a newly introduced flower crop in South Gujarat and was found to be severely affected by leaf spot/ blight disease in a considerably high proportion on the Floriculture Farm of Navsari Agricultural University, Navsari. Looking to the disease severity, the present investigation on various fungicides, antibiotics and mixed formulations was carried out to generate more scientific information and to find out suitable control measures for minimizing the crop losses.

## MATERIAL AND METHODS

Fifteen fungicides of three different types *viz.,* six systemic, four non-systemic, two antibiotics, three mix-formulations with their three different concentrations were used to test the *in vitro* efficacy against *Drechslera* state of *Trichometasphaeria holmii* (Table-1) by employing poison food technique. The required quantity of test fungicide was calculated, measured and then diluted with autoclaved PDA in the conical flask and 20ml of fungicidal medium was dispensed to each sterilize Petri plate after through shaking to facilitate uniform mixture. The inoculum, a mycelial disc of 5 mm diameter was cut with the help of sterilized cork borer from 8 days old pure culture and placed at the centre of Petri plate containing solidified respective fungicidal medium and each treatment was repeated three times. The PDA medium without fungicides served as control. The inoculated plates were incubated at room temperature (27 $\pm$ 2ÚC). The colony diameter of the fungus was recorded from three repetitions periodically. The per cent growth inhibition (PGI) was worked out by using the formula given by Vincent (1927)[4].

$$PGI = \frac{100(DC - TD)}{DC}$$

Where,
PGI = Per cent growth inhibition
DC = Average diameter of mycelial colony of control plate (mm)
DT = Average diameter of mycelial colony of treated plate (mm)

## RESULTS AND DISCUSSION

All the fungicides evaluated significantly reduced the growth of *Drechslera* state of *Trichometasphaeria holmii* as compared to control but all the fungicides and their concentrations significantly differed within themselves. The results are presented in Table-1 and depicted in Fig-1. The observations on radial growth were recorded in millimeter. Among all concentrations, the higher concentration of each fungicide produced maximum growth inhibition of the pathogen. Out of these, propiconazole (Tilt 25% EC), tridemorph (Calixin 80 % EC) and tricyclazole (Beam 75 %WP) at all the three concentration *viz.*, 500, 1000, 1500 ppm, copper oxychloride (Blitox 50%WP) and MEMC (Emisan 6% WP) at 1000,2000, 3000 ppm, kasugamycin at two concentration (500 and 1000 ppm) ,carbendazim 25 % +ipridione 27 % (Quintal 50 % WP) and carbendazim 25 % + mancozeb 27 % (Sixer 75 %WP) at 1000, 1500, 2000 ppm, while carbendazim (Bavistin 50 % WP) at 1000 and 1500 ppm, thiophanate methyl (Topsin-M 75% WP) at 1500 ppm concentration completely inhibited growth of the pathogen and proved highly fungitoxic at above mentioned concentrations.

The next best in order of merit was thiophanate methyl (Topsin-M 75% WP) at 1000 ppm (91.13 %) followed by thiophanate methyl (Topsin-M 75% WP) at 500 ppm (84.15 %) which was statistically at par with mancozeb (Dithane M-45 75% WP ) at 3000 ppm (82.82 %) which was again at par with kasugamycin (Kasu-B 3 % L) at 250 ppm (82.83 %) and velidomycin (Sheathmar 3% L ) at 1000 ppm (81.13 %) which was again at par with propineb (Antracol 70% WP ) at 1500 ppm (80.94 %) which in turn was at par with mancozeb (Dithane M-45 75% WP ) at 2000 ppm (79.24 %) which was again at par with carbendazim (Bavistin 50 % WP) at 500 ppm (77.35 %) which was again at par with velidomycin (Sheathmar 3% L ) at 500 ppm (76.79 %), chlorothalonil (Kavach 75% WP) at 3000 ppm (76.03 %) and mancozeb (Dithane M-45 75% WP ) at 1000 ppm (76.03 %) followed by

**Table 1.** Effect of different fungicides on the growth of *Drechslera* state of *Trichometasphaeria holmii* (Luttrell) Subramanian and Jain, *in vitro*

| S. No. | Technical and Trade names of Fungicides | Concentration (ppm) | Average colony diameter of pathogen (mm) | Per cent inhibition over control |
|---|---|---|---|---|
| Systemic fungicides | | | | |
| $T_1$ | Carbendazim | A - 500 | 20** (4.50)* | 77.35 |
| | (Bavistin 50 % WP) | B - 1000 | 0 (0.70) | 100 |
| | | C - 1500 | 0 (0.70) | 100 |
| $T_2$ | Propiconazole | 500 | 0 (0.70) | 100 |
| | (Tilt 25% EC) | 1000 | 0 (0.70) | 100 |
| | | 1500 | 0 (0.70) | 100 |
| $T_3$ | Tridemorph | 500 | 0 (0.70) | 100 |
| | (Calixin 80 % EC) | 1000 | 0 (0.70) | 100 |
| | | 1500 | 0 (0.70) | 100 |
| $T_4$ | Thiophanate methyl | 500 | 14 (3.80) | 84.15 |
| | (Topsin-M 75% WP) | 1000 | 7.83 (2.88) | 91.13 |
| | | 1500 | 0 (0.70) | 100 |
| $T_5$ | Propineb | 500 | 32.33 (5.73) | 63.39 |
| | (Antracol 70% WP ) | 1000 | 31 (5.61) | 64.9 |
| | | 1500 | 16.83 (4.16) | 80.94 |
| $T_6$ | Tricyclazole | 500 | 0 (0.70) | 100 |
| | (Beam 75 %WP) | 1000 | 0 (0.70) | 100 |
| | | 1500 | 0 (0.70) | 100 |
| Non systemic | | | | |
| $T_7$ | Copper oxychloride | 1000 | 0 (0.70) | 100 |
| | (Blitox 50%WP) | 2000 | 0 (0.70) | 100 |
| | | 3000 | 0 (0.70) | 100 |
| $T_8$ | Mancozeb | 1000 | 21.16 (4.65) | 76.03 |
| | (Dithane M-45 75% | 2000 | 18.33 (4.33) | 79.24 |
| | WP ) | 3000 | 15.16 (3.95) | 82.82 |
| $T_9$ | Chlorothalonil | 1000 | 35.16 (5.97) | 60.18 |
| | (Kavach 75% WP) | 2000 | 30.16 (5.53) | 65.84 |
| | | 3000 | 21.16 (4.65) | 76.03 |
| $T_{10}$ | MEMC | 1000 | 0 (0.70) | 100 |
| | (Emisan 6% WP) | 2000 | 0 (0.70) | 100 |
| | | 3000 | 0 (0.70) | 100 |
| Antibiotic | | | | |
| $T_{11}$ | Velidamycin | 250 | 29.16 (5.44) | 66.97 |
| | (Sheathmar 3% L ) | 500 | 20.5 (4.58) | 76.79 |
| | | 1000 | 16.66 (4.14) | 81.13 |
| $T_{12}$ | Kasugamycin | 250 | 15.16 (3.95) | 82.83 |
| | (Kasu-B 3% L) | 500 | 0 (0.70) | 100 |
| | | 1000 | 0 (0.70) | 100 |
| Mixed formulation (Systemic + Non-Systemic ) | | | | |
| $T_{13}$ | Carbendazim 25 % | 1000 | 0 (0.70) | 100 |
| | +Ipridione 27 % | 1500 | 0 (0.70) | 100 |
| | (Quintal 50 % WP) | 2000 | 0 (0.70) | 100 |
| $T_{14}$ | Carbendazim 25 % + | 1000 | 0 (0.70) | 100 |
| | Mancozeb 27 % | 1500 | 0 (0.70) | 100 |
| | (Sixer 75 %WP) | 2000 | 0 (0.70) | 100 |
| $T_{15}$ | Cymoxanil 8 % | 1000 | 33.33 (5.81) | 62.26 |
| | +Mancozeb 64 % | 1500 | 28 (5.33) | 68.3 |
| | (Curzate M8 72 %WP) | 2000 | 22 (4.74) | 75.09 |
| $T_{16}$ | Control | | 88.33 (9.42) | 0 |
| | S.Em. | | 0.0654 | |
| | C.D at 5 % | | 0.1839 | |
| | C.V. % | | 4.43 | |

* Figures indicate square root + 0.5 transformed values

** Figures indicate original values

cymoxanil 8 % + mancozeb 64 % (Curzate M8 72 %WP) at 2000 ppm (75.09 %) Whereas, the least effective chemicals were cymoxanil 8 % + mancozeb 64 % (Curzate M8 72 %WP) at 1500 ppm (68.03 %) which was at par with velidomycin (Sheathmar 3% L ) at 250 ppm (66.97 %) which was again at par with chlorothalonil (Kavach 75% WP) at 2000 ppm (65.84 %) and propineb (Antracol 70% WP ) at 1000 ppm (64.9 %) which was again at par with propineb (Antracol 70% WP ) at 500 ppm (63.39 %) which was at par with cymoxanil 8 % + mancozeb 64 % (Curzate M8 72 %WP) at 1000 ppm (62.26 %) which was again at par with chlorothalonil (Kavach 75% WP) at 1000 ppm (60.18 %).

In view of the different categories of fungicides evaluated against *Heliconia* leaf spot pathogen *Drechslera* state of *Trichometasphaeria holmii* following fungicides were found to be effective for each category and concentration mention below resulting in complete to major inhibition of the pathogen.

1. Systemic fungicides :- Propiconazole, tricyclazole and Tridemorph at 500,1000 & 1500 ppm, carbendazim at 1000 & 1500 ppm and Thiophanate methyl at 1000 & 1500 ppm.
2. Non- systemic fungicides: - Copper oxychloride and MEMC at 1000, 2000 & 3000 ppm and Mancozeb at 2000 & 3000 ppm.
3. Antibiotics: - Kasugamycin at 250, 500 & 1000 ppm and Velidomycin at 1000 ppm.
4. Mixed formulation (Systemic + Non-Systemic):- carbendazim 25 % + ipridione 27 % and Carbendazim 25 % + Mancozeb 27 % at 1000, 1500 & 2000 ppm.

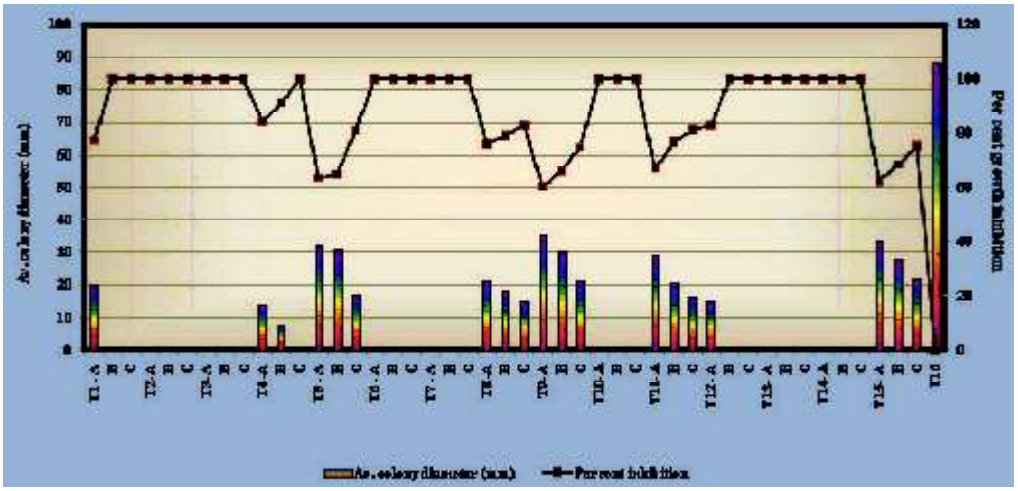

**Fig. 1.** Efficacy of different fungicides on growth of *Drechslera* state of *Trichometasphaeria holmii in vitro*

## DISCUSSION

Considering the effect of fungicides on the growth of *Drechslera* state of *Trichometasphaeria holmii* (Luttrell) Subramanian and Jain. Propiconazole, tricyclazole, tridemorph, Copper oxychloride, MEMC, Kasugamycin, carbendazim 25 % + ipridione 27 % and Carbendazim 25 % + Mancozeb 27 %proved to be the most effective at all three concentrations tried. Lore *et al*. (2007)[5] reported that tilt 25 EC @ 0.1 % (propiconazole) was found to be the most effective fungicide against three important diseases of rice namely, sheath blight (*Rhizoctonia solani* Kunh.), sheath rot (*Fusarium moniliforme* J. Sheld.) and brown spot (*Drechslera oryzae* Subram. & Jain.) followed by contaf 5 EC @ 0.1 % (hexaconazole) and bavistin 50 WP @ 0.1 % both *in vivo* & *in vitro*.; Sharma & Gour (2009)[6] found that seed dressing with carbendazim (@ 2g/kg seed) was most effective in controlling microflora of pea including *Drechslera tetramera* (McKinney) Subram. & Jain, followed by propiconazole (@ 2g/kg seed) and mancozeb (@ 2.5g/kg seed) and

Sunder *et al.* (2010)[7] reported that propiconazole (@ 0.1%) and hexaconazole (@ 0.2 %) were found to be most effective in reducing leaf spot severity , stalk rot incidence with significant increase in grain yield of rice followed by Mancozeb (@ 0.25 %), against *Drechslera oryzae* (Breda de Hann.) Subram. & Jain. The present results are in conformity with the findings of earlier workers.

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