International Journal of Humanities
and Social Sciences (IJHSS)
ISSN(P): 2319-393X; ISSN(E): 2319-3948
Vol. 5, Issue 1, Dec – Jan 2016, 179-182


International Academy of Science,
Engineering and Technology
Connecting Researchers; Nurturing Innovations

# INVESTIGATIONS ON FUNGICIDAL SENSITIVITY OF *SCLEROTIUM ROLFSII* (COLLAR ROT PATHOGEN) IN TUBEROSE

**ANITA MOHANTY[1], DIBYA SUNDAR KAR[2] & PRAVASINI BEHERA[3]**

[1]KVK, Puri, OUAT, Bhubaneswar, India

[2]KVK, Dhenkanal, OUAT, Bhubaneswar, India

[3]College of Agriculture, OUAT, Bhubaneswar, India

## ABSTRACT

*Six fungicides namely tilt (propioconazole), OPUS (epoxiconazole), Calixin (tridemorph), Indofil M-45(mancozeb), Blitox-50 (Cupper oxychloride) and Bavistin (Carbendazim) were evaluated against Sclerotium rolfsii causing collar rot of tube rose. At one hour of dipping of sclerotia in propioconazole significantly reduced the germination of sclerotia (26.7%). Carbendazim affected the germination but mancozeb could not reduce the germination.* In *in vivo evaluation of fungicides least mortality was found in propioconazole followed by epoxiconazole.*

**KEYWORDS:** Investigations on Fungicidal Sensitivity of *Sclerotium Rolfsii* (Collar Rot Pathogen) In Tuberose

## INTRODUCTION

Tuberose (*Polianthes tuberosa* L.) is one of the most important tropical ornamental bulbous flowering plants cultivated for production of long lasting flower spikes. It belongs to the family Amaryllidaceous and is native of Mexico. The flower spike of tuberose remains fresh for long time and finds a distinct place in the flower markets. Due to its immense export potential, cultivation of tuberose is gaining momentum day by day in our country. The plant is propagated by transplanting daughter tubers from older plants. This form of vegetative propagation favours the spread of many diseases. A number of fungus, bacteria, and virus and nematode diseases are spread in and on tubers, bulbs, or rhizomes of vegetatively propagated ornamental. Collar rot of tube rose caused by *Sclerotium rolfsii* Sacc. Is a problematic disease for Odisha. *Sclerotium rolfsii* is a polyphagous pathogen having a wide host range of 500 plant species (Punja, 1985). The pathogen is a soil borne fungus and survives in the form of sclerotia in the soil. Several management options are available for control of soil borne collar rot disease. However, disease outbreaks of collar rot disease are still not uncommon. Presently, the collar rot disease is managed through application of chemical fungicides that have several concerns in the areas of environmental safety, pathogen resistance to fungicides, groundwater pollution and escalated costs. Keeping in view these negative effects of fungicidal usage, an alternative or a supplement of chemical fungicidal management of collar rot disease in tuberose is the order of the day to save the crop from such a devastating disease.

## MATERIALS AND METHODS

The plant samples were collected from farmer's field. Each sample was labelled properly and taken into laboratory for examination of incidence of collar rot caused by *Sclerotium rolfsii.*

Isolation of Pathogens was done by with the moist blotter method recommended by ISIA(1953,1961), the diseased plant sample collected were washed and diseased collar parts were cut into pieces which were then washed and

diseased collar parts were cut into pieces which were then disinfected with 1:1000 (0.1%) mercuric chloride solution. These were transferred to PDA slants after several washing in sterile water and incubated at 280C+-10C. The culture was maintained by sub-culturing to time PDA slants.

The pure culture was obtained by transferring a young immature white Sclerotium from culture tube to a fresh PDA slant and incubated for 9-10 days. From this culture a young white Sclerotium was again transferred to sterilised PDA slant. Thus a pure culture was obtained and maintained by sub culturing.

**In Vitro Evaluation of Fungicide on Sclerotial Germination**

In order to find the efficacy of different fungicide against sclerotial germination of *S. rolfsii*, sclerotia were produced in mass in ground nut shell medium. Fungicides like Tilt, Opus, Calixin, Indofil M-45, Blitox-50 and Bavistin were diluted to desired concentration. Young sclerotia were dipped in such fungicidal solution separately in culture tube for 1,6, and 24 hr. Sterilised moist chamber were prepared lined with filter papers. In each petridishes 20 nos of sclerotia were taken by means of camel hair brush and moistened with 2% sucrose solution. Germination was recorded after 48 hrs of incubation and the germinated sclerotia were counted. Each petridish was considered one replicate.

To conduct the **invivo** test, tube rose plants were planted in pots filled with sterilised soil. After the establishment of the plant, the top soil of about 2-3 cm was worked out and 15 g of mycelia prop gules grown in sorghum grains were mixed and covered with soil. Watering was done after 48 hr of inoculation. Different fungicidal solution od desired concentration was added. @1000ml/pot twice at 15 days interval. Disease incidence and mortality of plants due to collar rot caused by S. rolfsii was recorded.

## RESULTS AND DISCUSSIONS

Systematic fungicide such as proploconazole, carbendazim and trimorph were proved highly toxic in inhibiting sclerotial germination at their recommended doses when sclerotia were dipped in respective fungicides for 24 hours. It is evident from the table 1. That mancozeb did not respond in reducing sclerotial germination. The above three systematic fungicides probably penetrated into sclerotia only after a dipping period of 24 hours and succeeded in reducing germination fully. Ineffectiveness of mancozeb against germination of *S. Rolfsii* might be due to none penetration /none absorbance of the compound into sclerotial body. In our investigations, the fungicide, propiconazole though highly inhibitory to collar rot pathogen, *S. Rolfsii* .Several reports on the management of collar rot disease were reported earlier. Mukherjee and Tripathi (2001) reported that propiconazole completely inhibited *S. Rolfsii* of french bean at 50 µg/ml. Complete inhibition of tuberose isolate of *S. Rolfsii* at 100 ppm concentration was reported by Das and Panda (1997). Chowdary (1997) and Bhat and Srivastava (2003) reported complete inhibition of *S. Rolfsii* (Bell pepper and French bean) at 250 ppm concentration of propiconazole. Thus above three systematic fungicides may be suggested for the control of collar rot tuberose basing on their performance in laboratory.

All the fungicides evaluated *in vivo* against collar-rot of tube rose minimised the incidence of the disease (table 2). However, three of those mainly systematic fungicides such as propioconazole (0.1%) epoxiconazole (0.1%) and carbendazim (0.1%) were found more effective as compared to others in descending order of their efficacy. These three fungicides were found superior to tridemorph, mancozeb and copper oxychloride and were at par with each other statistically. Excellant control of the diseas is achieved using them as soil drench viz. Propioconazole (90.9%) epoxiconazole (87.3%) and carbendazim (83.3%) respectively. Therefore these three systematic fungicides are of first

choice and tridemorph, mancozeb and copper oxychloride are to be considered as second choice against control of collar-rot in tube rose. Systematic fungicides were costly; therefore, they may be used by affluent farmers growing tuberose commercially. On the other hand poor and marginal farmer may prefer the use of protectant fungicides like mancozeb or copperoxychloride for their low cost. Carbendazim has been reported effective against *S. Rolfsii* causing root-rot in different crops (Mukhopadhayay and Thakur, 1971; Siddaramiah, 1979, Lal and Nagarajan, 1983; Waraitc *et.al*., 1986; Tiwari, 1995). Mancozeb was suggested as seed treatment for the control of sclerotial wilt of ground nut (Dhamnikar and Peshney, 1982; Pati and Rane, 1982). Recently a trizole group of fungicide (hexaconazole) was was reported successful in controlling root/collar-rot of gram and sunflower by soil drench *in vivo*. However, there is no information, regarding the performance of propioconazole and expioconazole against *S. Rolfsii* inciting collar-rot in any crops. Probably this forms the first new information on propioconazole and expioconazole. For the control of *S. Rolfsii* causing collar rot in tube rose. These two fungicides may be used as very good substitute of pentachloronitrobenzine in the control of soil burn pathogen like S. *Rolfsii*. The data on one season cannot rely upon; therefore, the trial should be repeated for one or more, season to draw final conclusion.

## REFERENCES

1. Anitha Chowdary, K. (1997) Studies on scleortial wilt of bell pepper (Capsicum annuum L.) M.Sc. (Ag.) Thesis Acharya N.G. Ranga Agricultural University, Hyderabad (A.P).
2. Arunasri, P., Chalam, T.V., Eswara Reddy, N. P., Tirumala Reddy, S. and Ravindra Reddy, B. (2011), investigations on fungicidal sensitivity of trichoderma spp and sclerotium rolfsii (collar rot pathogen) in crossandra, IJABPT, 2, 2
3. Das, S. R. and Panda, S. N. (1997) Evaluation of fungicides against Sclerotium rolfsii causing collar rot of tuberose. Orissa Journal of Horticulture 25: 46-48.
4. Lal, R. And Nagarjun, K.(1983). Studies on collar –rot of tobacoo caused by *Sclerotium rolfsii*. *Indian Phytopath*.36:254-255.
5. Mukhopadhya, A.N. and Thakur, R.P. (1971) Control of Sclerotium root-rot of sugarbeet with systemic fungicides . *Plant dis. Reptr*.55:630-634.
6. Mukherjee, S. and Tripathi, H. S. (2001) Biological and chemical control of wilt complex of French bean. Journal of Mycology and Plant Pathology. 30: 380-385.
7. Narayana Bhat. And Srivastava, L. S. (2003) Evaluation of some fungicides and neem formulations against six soil-borne pathogens and three Trichoderma spp. In vitro. Plant Disease Research 18: 56-59.
8. Patii, M.B. and Rane, M.S. (1982). Incidence and control of Sclerotium rolfsii wilt of ground nut. *Pesticides*.16:23-24.
9. Siddarnamaiah, A.L.; and Prasad, K.S.K and Shivam, B.M. (1979). Laboratory evaluation of fungicides against Sclerotium rolfsii Sacc causing root-rot of ground nut.*Pesticides*.13:31-32.
10. Tiwari, R.K.S. (1995). Comparative evaluation of three systemic fungicides against *Sclerotium rolfsii* Sacc causing root-rot in gram and sunflower. *Indian J. Mycol.Pl.Pathol*.25:243-245.

11. Waraitch, K. S.; Kanwar, R.S. and Kumar B. (1986). Fu ngicidal control of *Sclerotium* rot of sugar beet (Beta vulgaris) caused by Sclerotium rolfsii Sacc, *Indian pytopath*. 39:100-102.

## APPENDICES

**Table 1: Effect of Various Fungicidal Dip in Different Time Period (hr) on Sclerotial Germination (%) of S. Rolfsii**

| Fungicide | 1 hr | 6 hr | 24 hr |
|---|---|---|---|
| Tilt(propioconazole) | 26.7 (30.99) | 16.7 (23.85) | 0 (0) |
| Opus(Epoxiconazole) | 66.7 (54.7) | 40.0 (39.23) | 6.7 (12.48) |
| Calixin(Tridemorph) | 76.7 (61.22) | 50.0 (45.00) | 0 (0) |
| Indofile M-45(mancozeb) | 100.0 (90.0) | 96.7 (83.85) | 86.7 (68.85) |
| Blitox-50(Copper oxychloride) | 96.7 (77.71) | 73.3 (59.01) | 56.7 (48.85) |
| Bavistin( carbendazim) | 56.7 (48.85) | 36.7 (37.22) | 0 (0) |
| Control(sterile water) | 100.0 (90.00) | 100.0 (90.00) | 100.0 (90.0) |
| SE (m) | (4.67) | (5.23) | (2.58) |
| C.D.(0.05) | (8.65) | (9.39) | (7.94) |

*Figures in parentheses are angular transformed value

**Table 2: Effect of Fungicides as Soil Drench on the Mortality of Tube Rose Plants Caused by S. Rolfsii**

| Fungicide | Dose (%) | Mortality of Plants Due to Collar Rot (%) | Percent Disease Control(PDC) |
|---|---|---|---|
| Tilt(propioconazole) | 0.1 | 8.3 (16.21) | 90.9 |
| Opus(Epoxiconazole) | 0.1 | 11.6 (19.30) | 87.3 |
| Calixin(Tridemorph) | 0.05 | 30.0 (33.16) | 67.2 |
| Indofile M-45(mancozeb) | 0.3 | 40.0 (39.31) | 56.3 |
| Blitox-50(Copper oxychloride) | 0.3 | 46.6 (43.07) | 49.1 |
| Bavistin( carbendazim) | 0.1 | 15.0 (22.59) | 83.3 |
| Control(sterile water) | | 91.6 (76.25) | Nil |
| SE (m) | | (3.60) | |
| C.D.(0.05) | | (11.09) | |

*Figures in parentheses are angular transformed value