The Pharma Innovation Journal 2023; 12(12): 4199-4201

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(12): 4199-4201

www.thepharmajournal.com
Received: 24-11-2023
Accepted: 28-12-2023

Bhumika Koma
College of Agriculture and Research Station, Kurud, Distt-Dhamtari, Indira Gandhi Krishi Vishwavidyalaya, Raipur Chhattisgarh, India

Corresponding Author:
Bhumika Koma
College of Agriculture and Research Station, Kurud, Distt-Dhamtari, Indira Gandhi Krishi Vishwavidyalaya, Raipur Chhattisgarh, India

Assessment of effects of *Trichoderma* spp. on the root and stem rot disease of *Aloe vera* Plants caused by fungus *Rhizoctonia solani*

Bhumika Koma

Abstract
This study was conducted at the College of Agriculture and Research Station, Kurud, 493663, Distt-Dhamtari, to asses the effect of application of *Trichoderma* spp. causative pathogen for root and stem-end rot of *Aloe vera* plants. In addition to examining the effectiveness of *Trichoderma* spp. in preventing *Aloe vera* plants from becoming infected with pathogenic fungus, this paper will also study their capacity to enhance the plant's development features *Trichoderma* spp. decreased disease incidence of *Rhizoctonia solani*, and increased plant growth. Thus, the finding of present investigation holds a good promise in root and stem rot disease caused by fungus *Rhizoctonia solani* management. The result showed that Inhibitory effects on *Rhizoctonia solani* was observed in bipartite interaction with *Trichoderma viride* (69.06%) and with *Trichoderma harzianum* (70.31%) xhibiting.
It was significantly reduced 05.23% damage in the *Trichoderma harzianum* treated pots was observed. The results showed that *Trichoderma harzianum* had the most effective results on features of height, number of leaves, and off shoots of the *Aloe vera* plant, The table shows the significant increase in the plant hight, number of *Aloe vera* leaves and off shoots that were treated with *Trichoderma harzianum* compared with the control.

Keywords: *Aloe vera*, *Rhizoctonia solani*, *Trichoderma* spp.

Introduction
Medicinal plants have many healing and medicinal properties, beside their antioxidant activities (Rajeshwari & Andallu 2011) [7] which made them to be a reliable source for manufacturing chemicals (Sheet & Ali 2011) [8]. *Aloe vera* is in the cactus family Asphodelaceae (Liliaceae) and reproduces by cuttings and seeds. It is the oldest plant used for medicinal purposes. The historical records indicate that *Aloe vera* was used in the treatment of some diseases more than 6000 years ago, since the Roman era (Crosswhite & Crosswhite 1984) [1]. *Aloe vera* is characterized by containing antioxidant and antimicrobial compounds (Rajasekaran *et al*. 2006) [5]. The genus Aloe includes more than 300 species, the most important and most widely used medicinally (Nazar 2011) [2]. It is a succulent plant whose leaves are seated, broad, dense, green, fleshy, covered with a waxy skin. The height of the plant ranges between 60-100 cm (Panovska *et al*. 2005) [4]. *Aloe vera* leaves are characterized by its antioxidant and antimicrobial activities (Rajasekaran *et al*. 2006) [5], containing a large number of mineral elements, especially potassium, calcium, sodium and magnesium, important in human health. In addition, it also contains twenty amino acids with relative amount of fatty acids, the most important of which are Olic, Linoleic, and Stearic (Tungala *et al*. 2011; Kumari *et al*. 2012) [9]. The plant is also a source antioxidation vitamins (A, B and C) especially vitamin A and C (Rajesh *et al*. 2012) [6]. *Aloe vera* is one of the few plants that contain vitamin B12 in addition to other active compounds such as minerals, lignin and saponins (Pankaj *et al*. 2013) [3]. The gel is one of the contents of *Aloe vera* leaves. It is a viscous, colourless liquid that contains several compounds, including anthraquinones, glycosides, glycoproteins, and prostaglandins.
Rhizoctonia solani causing root and stem rot disease of *Aloe vera*. *Rhizoctonia solani* showed different infection symptoms ranging from yellowing and leaf curling, roots in reddish brown colour, and the infection progresses resulted in appearance of reddish necrotic areas on the crown area. The plants were easy to pull out when the taproot is rotten or necrotic. As the disease progressed upward, leaves in the basal part of stems became red-brown and gradually fell off. In severe cases, the whole plants became rotten and wilted.

A pot experiment was carried to study the impact of the application of.

Materials and Methods

Place of study and isolation of fungal strains: The experiments were conducted under lab and pot conditions in the college of agriculture and Research Station Kurud. The pathogen, *Rhizoctonia solani* was isolated from the infected roots of *Aloe vera* plants which were collected from the college of agriculture and Research Station Kurud. The isolation was performed on potato dextrose agar (PDA) media. *Trichoderma viride* was procured from bio-control Lab, Indira Gandhi Agriculture University, Raipur (CG).

***In vitro* experiment:** The antagonistic activity of two isolates of *Trichoderma* spp. was evaluated against *Rhizoctonia solani* by dual culture technique. *T. viride* and *T. harzianum* Antagonistic effect was evaluated by dual culture method as described by Rahman *et al*. (2009). All the plates were incubated at 25 °C and mycelium growth inhibition (%) of *Rhizoctonia solani* was measured at 120 h of incubation. Antagonistic effect of the test fungi was estimated by measuring their radial growth in comparison to the control plates by the following formula.

$$I = [(C-T) / C] \times 100$$

Where: I: % inhibition in mycelia growth
C: Growth of pathogen in control plates
T: Growth of pathogen in dual culture plates.

***In vivo* experiment:** *In vivo* pot experiment was conducted in completely randomized block design with three replications to evaluate the performance of *Trichoderma* isolates against *Rhizoctonia solani*. Clay pots of 24 cm diameter filled with 6 kg sterilized sandy loam soil were used in this experiment. Both the species of *Trichoderma* and *Rhizoctonia solani* were applied as soil application @50 g/kg and 40 g/kg, respectively. Two *Aloe vera* seedlings were transplanted in each pot. The details of total 4 treatments with 10 replications including the control is given in Table-1. Pots were watered daily and equal moisture was maintained in each pot. after the end of the experiment, the percentage of infection and its severity on the shoot and root systems, as well as the shoot and root features which were studied.

Treatment details

T_1 Control (without *Rhizoctonia solani* and *Trichoderma* spp.)
T_2 *Rhizoctonia solani.*
T_3 *Rhizoctonia solani* + *Trichoderma* spp.
T_4 *Trichoderma* spp.

Results and Discussion

Morphological identification of fungal strains:

Rhizoctonia solani was isolated on PDA media at 25°C incubation temperature. The colony appeared woolly to cottony, flat and spreading. The color and pigmentation of the isolates on PDA medium was brown fungal colony. Further, the isolate identification was confirmed by Microscopic examination of the developing colony at 40X magnification, exhibited that the mycelium is divided with many branches at almost right angles with the main mycelium. The presence of transverse septa near the point of emergence of the branch with a clear narrowing in the areas of branching, and it is one of the taxonomic signs of the fungus *Rhizoctonia solani*.

Antagonistic effect of *Trichoderma* sp.

In vitro antagonistic potential of *Trichoderma* sp. was studied against fungal plant pathogens *Rhizoctonia solani* following dual culture method and was assessed after 120 h of bipartite interaction. The data are presented in Table 1 revealed that isolates of *Trichoderma* sp in dual culture significantly inhibited mycelial growth of *Rhizoctonia solani*. A clear visible inhibitory zone was observed in the region of confluence between species (*Trichoderma* sp vs. *Rhizoctonia solani)* was observed. Inhibitory effects on *Rhizoctonia solani* was observed in bipartite interaction with *Trichoderma viride* (69.06%) and with *Trichoderma harzianum* (70.31%) xhibiting.

Table 1: Antagonistic effect of *Trichoderma* spp. against *Rhizoctonia solani* under *in-vitro* condition

S. No.	*Trichoderma* spp.	Radial growth(mm)		Inhibition (%)
		Trichoderma spp.	*R. solani*	
1	*Trichoderma viride*	44.18	28.15	69.06
2	*Trichoderma harzianum*	53.04	27.01	70.31
3	Control	91.00	91.00	00.00

Average of six replications; Figures in parenthesis indicate reaction type as a measure of mycoparasitism or antagonism

The effect of application of *Trichoderma harzianum* on the incidence and severity of the infection with the *Rhizoctonia solani* on the *Aloe vera* plants

The Disease incidence was measured at 75 day after transplanting. As expected, it was the highest 97.90% in *Rhizoctonia solani* treated pots the *Aloe vera* plants that were inoculated by *Rhizoctonia solani* presented necrosis in the root and stem. A change in basal part of stems became red-brown and ended with plant death. Followed by 27.02% was reported in the treatments with *Rhizoctonia solani* + *Trichoderma harzianum* the incidence of 22.12% was reported in the control treatment. It was significantly reduced 05.23% damage in the *Trichoderma harzianum* treated pots was observed. The treatment shows that there is an anti-correlation between them, which means the lower the percentage and severity of the infection with application of *Trichoderma harzianum.*

The effect of application of *Trichoderma harzianum* on the height, number of leaves and off shoots of the *Aloe vera* plants

The results of the analysis in table (2) indicate that there was a significant difference in the treatments that were used and their effects on the features of the infected *Aloe vera* plant with the *Rhizoctonia solani*. The results showed that *Trichoderma harzianum* had the most effective results on features of height, number of leaves, and off shoots of the *Aloe vera* plant, The table shows the significant increase in

the plant hight, number of *Aloe vera* leaves and off shoots that were treated with *Trichoderma harzianum* compared with the control, so this shows the correlation with the decrease in the percentage of infection *Rhizoctonia solani* on the shoot and root system of *Aloe vera* plant.

Table 2: Effects of various treatments on *Aloe vera* disease incidence and plant growth features

Treatments		Features			
		Plant height (cm)	**Number of leaves**	**Number of off shoots**	**Disease Incidence (%)**
T_1	Control (without *Rhizoctonia solani* and *Trichoderma harzianum*)	10.11	09.20	01.32	27.02
T_2	*Rhizoctonia solani*	03.33	01.02	00.00	97.90
T_3	*Rhizoctonia solani* and *Trichoderma harzianum*	15.15	13.16	03.32	22.12
T_4	*Trichoderma harzianum*	24.38	17.32	04.68	05.23

Conclusion

I was studied about the too much information of herbal plant i.e *Aloe vera*. It is a specific plant, it show various types of activities in medical era. So it play an important role in pharmaceutical field. *Aloe vera* and its preparation have been widely used as a medicine since ancient times. Various researches have been conducted to prove the efficacy of *Aloe vera* in various health problems. The active ingredient hidden in its succulent leaves have the power to soothe human life and health in a myriad ways. *Aloe vera* as the wonder plant is multiple from being an antiseptic, ant-inflammatory agent, helps in relieving like cancer and diabetes, and being a cosmetic field. In conclusion, under pot, the inoculated plants with *Trichoderma harzianum* strains decreased *Rhizoctonia solani* incidence. In addition, it was observed that the plants treated with the *Trichoderma harzianum* showed higher values in the variables: plant height, number of leaves, and off shoots.

References

1. Crosswhite HM, Crosswhite H. Parametric model for f-shell configurations. I. The effective-operator Hamiltonian. JOSA B. 1984;1:246-254.
2. Nazar R, Iqbal N, Syeed S, Khan NA. Salicylic acid alleviates decreases in photosynthesis under salt stress by enhancing nitrogen and sulphur assimilation and antioxidant metabolism differentially in two mung bean cultivars. Journal of Plant Physiology. 2011;168:807-815.
3. Pankaj P. Patient-specific modelling of bone and bone-implant systems: the challenges. International Journal for Numerical Methods in Biomedical Engineering. 2013;29:233-249.
4. Panovska TK, Kulevanova S. Effect of some Teucrium species (Lamiaceae) on lipid peroxidation in rat liver microsomes. Fresenius Environmental Bulletin. 2005;14:957-959.
5. Rajasekaran S, Ravi K, Sivagnanam K, Subramanian S. Beneficial effects of *Aloe vera* leaf gel extract on lipid profile status in rats with streptozotocin diabetes. Clinical and Experimental Pharmacology and Physiology. 2006;33:232-237.
6. Rajesh SG, Laddha KS. Synthesis of 4, 5-dihydroxy-9.10-dioxanthracene-2-benzylcarboxylate ester from rhein. Journal of Pharmacognosy and Phytochemistry. 2012;1:10-13.
7. Rajeshwari U, Andallu B. Medicinal benefits of coriander (*Coriandrum sativum* L). Spatula DD. 2011;1:51-58.
8. Sheet AQ, Ali SH. Some methods using for diseases treated in Ashor's Region. Mosul University Publication, Ministry of Higher Education and Scientific Research, Iraq; c2011.
9. Tungala A, Ajay JY, Gajula PK, Dinesh J, Kumar JD. Conversion of malic acid into lactic acid in *Aloe vera* by using lactic acid bacteria. Journal of Phytology. 2011;3:1-11.