RESEARCH PAPER | Asian Journal of Bio Science, Volume **8** | Issue 1 | April, 2013 | 117-119
Received : 01.03.2013; **Revised :** 14.03.2013; **Accepted :** 15.04.2013

Management of aonla rust incited by *Ravenalia emblicae* var. *fructicolae* Syd

R.G. JAT, S.K. GOYAL **AND** R.P. DIDEL

Department of Plant Pathology, S.K.N. College of Agriculture (SKRAU), JOBNER (RAJASTHAN) INDIA
Email : rgjat.patho@gmail.com; shashikant69@gmail.com

Indian gooseberry (*Emblica officinalis* Gaertn) commonly known as aonla is one of the important fruit crop in arid and semi arid growing regions. To see the effect of different bioagents alone and alongwith effective fungicide against aonla rust, a field experiment was conducted. Pooled data revealed that chlorothalonil (0.2 %) reduced the maximum disease intensity significantly in comparison to control and other treatments. Minimum disease severity (5.80%) was obtained in chlorothalonil (0.2 %) followed by 1% *Trichoderma viride* +0.1% chlorothalonil (8.82 PDI). Maximum per cent disease control (71.80) was obtained in chlorothalonil (0.2 %) followed by 1% *Trichoderma viride* + 0.1% chlorothalonil (57.12) and also increased fruit yield significantly in comparison to other treatments. Maximum B: C ratio was obtained with chlorothalonil 0.2% (1:1.38) followed by 1% *Trichoderma viride* + 0.1% chlorothalonil (1: 1.29).

Key words : *Emblica officinalis, Ravenalia emblicae, Trichoderma viride, Pseudomonas fluorescens*, Chlorothalonil, Aonla rust

How to cite this paper : Jat R.G., Goyal, S.K. and Didel, R.P. (2013). Management of aonla rust incited by *Ravenalia emblicae* var. *fructicolae* Syd. *Asian J. Bio. Sci.*, **8** (1) : 117-119.

INTRODUCTION

Aonla (*Emblica officinalis* Gaertn.) is an important economic fruit crop which come up very well in vertisols even under rainfed conditions for arid and semi arid tracts, which is known for its high ascorbic acid content and for its higher medicinal and nutritive value. Rust of aonla caused by *Ravenalia emblicae* var. *fructicolae* Syd. is a serious constraint in aonla growing areas in the Rajasthan (Anonymous,1996).This disease also widely occurs in other states like; U.P., Andhra Pradesh, Tamil Nadu, Haryana, etc. It was first observed in Rajasthan by Tyagi (1967). Affected fruits may drop before maturity causing severe loss in productivity and quality of fruits (Tyagi and Pathak, 1988; Jat and Goyal, 2004.). On the fruits, black pustules appear which sometimes cover the entire surface of the fruits. Plants with a severe attack on fruits show no symptoms on the leaves and vice-versa (Tyagi, 1967). Owing to expansion of aonla orchards, working out of management strategies is equally important to sustain the yield and quality of aonla fruits. Hence, the present study was undertaken to see the effect of different bioagents alone and alongwith effective fungicide against aonla rust.

RESEARCH METHODOLOGY

A field experiment was conducted on local cultivar at farmer's field at Itawa Bhopji village (Chomu) in statistically Randomized Block Design in the four consecutive years (2006-2007 to 2009-2010). For the management, chlorothalonil fungicide was selected and applied alone and alongwith bioagents which was found most effective against the aonla rust (Theradimani *et al*, 2006 and Anonymous, 2005). Each treatment was replicated thrice by keeping single tree per replication. Under the study different bioagents alone and alongwith effective fungicide (T_1= 1% *P. fluorescens*, T_2 = 1% *P. fluorescens*+ 0.1% chlorothalonil, T_3= 1% *Trichoderma viride*, T_4= 1%*Trichoderma viride*+ 0.1% chlorothalonil, T_5= 0.1% chlorothalonil alone spray and T_6= 0.2% chlorothalonil alone spray) were tested against aonla rust. An equal number of unsprayed plants were kept as control. Four foliar sprays were given at 15 days interval and disease intensity was recorded after 20 days of last spray. First spray was given in 1st week of August, just after the initiation of the disease symptoms. The data on the development of rust on aonla fruits were recorded on the four marked fruiting twigs per plant. Diseased fruits were graded into six categories of disease incidence *i.e.* 0=healthy, 1=1-10, 2=10.1-25, 3=25.1-50, 4=50.1-

Asian J. Bio Sci., 8 (1) April, 2013 : 117-119
Hind Institute of Science and Technology

Table 1: Effect of different bioagents and fungicide against aonla rust (Pooled) 2006-2007 to 2009-2010

Sr. No.	Treatments	Per cent disease index (PDI)*		Per cent disease control (PDC)	Fruit yield (kg/tree)*
1.	1% *P. fluorescens*	18.00	(25.10)	12.49	80.25
2.	1% *P. fluorescens*+ 0.1% chlorothalonil	12.56	(20.79)	38.94	92.75
3.	1%*Trichoderma viride*	14.75	(22.63)	28.29	89.87
4.	1%*Trichoderma viride*+ 0.1% chlorothalonil	8.82	(17.26)	57.12	101.87
5.	0.1% chlorothalonil alone spray	10.50	(18.91)	48.95	96.10
6.	0.2% chlorothalonil alone spray	05.80	(13.94)	71.80	110.87
7.	Unsprayed check	20.57	(26.99)	-	66.50
	S.E.±	0.223			1.628
	C.D. (P=0.05)	2.760			5.017

*Average of three replications
Figures in parentheses are angular transformed values

Table 2 : Economic benefit cost ratio of various treatments applied against aonla rust

Sr. No.	Treatments	No. of sprays	Cost of bioagent/ fungicide (Rs.)	Total cost of spraying (Rs.)	Yield (kg/ tree)	Gross return (aonla fruits sell out @Rs.11/- per kg	Profit (Rs.)	Cost benefit ratio
1.	1% *P. fluorescens*	4	160.00	184.00	80.25	882.75	698.75	1: 0.95
2.	1% *P. fluorescens*+ 0.1% chlorothalonil	4	250.88	274.88	92.75	1020.25	745.37	1: 1.02
3.	1%*Trichoderma viride*	4	64.00	88.00	89.87	988.57	900.57	1: 1.23
4.	1%*Trichoderma viride*+ 0.1% chlorothalonil	4	154.88	178.68	101.87	1120.57	941.69	1: 1.29
5.	0.1% chlorothalonil alone spray	4	90.88	114.88	96.10	1057.10	942.22	1:1.28
6.	0.2% chlorothalonil alone spray	4	181.76	205.76	110.87	1219.57	1013.81	1:1.38
7.	Unsprayed check	-	-		66.50	731.50	731.50	

Cost of bioagents/ fungicides;- Kavach 75 WP- Rs. 284/250 gm *i.e.* Rs. 1.136 /g,
Pseudomonas fluorescens - Rs. 200/1000 g *i.e.* Rs. 0.20 /g,
Trichoderma viride - - Rs. 80/1000 g *i.e.* Rs. 0.08 /g,
Cost of labour for spray: Rs. 120 per manday (20 plants sprayed in one manday *i.e.* Rs. 6/-per plant)
Rate of aonla fruits: Rs. 11/- per kg
Biological control of aonla rust

75, 5=>75% fruit surface covered with rust pustules.

The per cent disease index (PDI) and percent disease control (PDC) were calculated according to the following formulae:

$$\text{PDI} = \frac{\text{Sum of all numerical ratings}}{\text{Total number of fruits examined x 5}} \text{ x 100}$$

$$\text{PDC} = \frac{\text{PDI in control - PDI in treatment}}{\text{Sum of all numerical ratings}} \text{ x 100}$$

Fruit yield of the tree was also recorded in each treatment at the time of fruits harvesting.

RESEARCH FINDINGS AND ANALYSIS

Pooled data presented in Table 1 revealed that all the treatments tested against aonla rust reduced the disease severity and also increased the fruit yield significantly in comparison to control. Chlorothalonil (0.2 %) reduced the maximum disease intensity significantly in comparison to control and other treatments. Minimum disease severity (5.80%) was obtained in chlorothalonil (0.2 %) followed by 1% *Trichoderma viride* +0.1% chlorothalonil (8.82 PDI). Whereas, in control PDI was 20.57. Maximum per cent disease control (71.80) was obtained in chlorothalonil (0.2 %) followed by 1% *Trichoderma viride* + 0.1% chlorothalonil (57.12) and also increased fruit yield significantly in comparison to other treatments. To circumvent pollution hazard due to injudicious use of agro-chemicals and also to avoid development of resistance in pathogenic fungi to commonly used fungicides, use of biocontrol agents for the management of plant diseases has been increased tremendously in recent years. Keeping in view the importance of different bioagents, the bioagents were applied against the aonla rust. Gupta and Shyam (1998) reported that chlorothalonil (0.2%) was found most effective against powdery mildew and rust of pea. These findings are in close agreement with the results of Jat (1999), Theradimani *et al.* (2006) and Anonymous (2005) who reported that chlorothalonil was found most effective fungicide against the aonla rust. In the present investigation economic benefit: cost ratio of different treatments applied against the rust disease was also find out and the results revealed that maximum B: C ratio (Table 2) was obtained with chlorothalonil 0.2% (1:1.38) followed by 1%*Trichoderma viride*+ 0.1% chlorothalonil (1: 1.29).

LITERATURE CITED

Anonymous, (1996). Annual report of AICRP on arid zone fruits , Center-Jobner.pp.77.

Anonymous, (2005). Annual report of AICRP on arid zone fruits , Center-Jobner.pp.

Gupta, S.K. and Shyam, K.R. (1998). Control of powdery mildew and rust of pea by fungicide. *Indian Phytopathol.*, **51** (2):184-186.

Jat, R.G. (1999). Bienniel report, Tenth group workers meeting AICRP on AZF. Pp 119-200.

Jat, R.G. and Goyal, S.K. (2004). Estimation of losses in aonla fruit yield caused by rust. In Proceedingg of ISMPP and National Symposium on Advances in fungal diversity and host pathogen interactions. Goa.

Theradimani, M., Juliet Hepziba, S. And Siddeswaram, K. (2006). Management of aonla rust (*Ravenalia emblicae*) using fungicides and bio control agents. *Indian J. Arid Hort.*, **1** (1): 61-62.

Tyagi, R.N.S. (1967). Morphological and taxonomical studies on the genus *Ravenalia* Berk. Occurring in Rajasthan. Ph.D. Thesis, University of Rajasthan, Jaipur, RAJASTHAN (INDIA).

Tyagi, R.N.S. and Pathak, A.K. (1988). Control of aonla (*Emblica officinalis* Gaertn) rust. (*Ravenalia emblicae* Syd.) through fungicides. *Indian J. Mycol. & Pl. PaIth*., **17**(2): 218- 219.