

OCCURRENCE OF ALUMINIUM PHOSETHYLE (ALLITTE) RESISTANCE IN *PLASMOPARA VITICOLA* CAUSING DOWNY MILDEW OF GRAPEVINE IN MAHARASHTRA

V. C. KHILARE*, A.S. DEOKATE and L.V. GANGAWANE

Soil Microbiology and Pesticides Laboratory, Department of Botany,

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad 431004, India.

* Botany Research Centre, Department of Botany, Vasant Rao Naik Mahavidyalaya, Aurangabad 431003, India.

Email : Khilarevikram@yahoo.com.

Use of aluminium phosethyl (Allitte) fungicide has led to the development of resistance in *Plasmopara viticola*. Among 15 isolates of pathogen 6.66% isolates showed MIC (minimum inhibitory concentration) between 791.21 µg/ml (sensitive isolate) while 39.96% population showed MIC between 4415.58 to 4669.30 µg/ml (resistant population). The highly resistant isolate Pv-15 (MIC 18786.68 µg/ml and resistant factor 23.75) indicates the development of resistance against aluminium phosethyl in Maharashtra.

Keywords : Aluminium phosethyl; Downy mildew; Fungicide resistance; Grape.

Introduction

Grape (*Vitis vinifera* L.) is attacked by several diseases of which downy mildew is an important disease in Maharashtra caused by *Plasmopara viticola*. It is very severe in rainy season and results in a total crop loss and also decreases the quality of berries if proper management strategies are not undertaken. Different fungicides like Bordeaux mixture, metalaxyl, aluminium phosethyl and fycol are recommended for the management of this pathogen^{1,3,6,12,13}. However, application programme of aluminium phosethyl may influence the development of resistance in the pathogen⁴. The present paper reports the survey of a highly resistant strain of *P. viticola* from grape growing areas of Maharashtra.

Materials and Methods.

Plasmopara viticola strains were collected from different areas of Maharashtra. The sensitivity of pathogens against aluminium phosethyl was determined by floating disc method². The surface sterilized discs (14 mm in diameter) were inoculated with sporangial suspension (10⁴/ml) and floated on different concentrations (500 to 20,000 µg/ml of a.i.) of aluminium phosethyl solutions. The plates were incubated at laboratory conditions at 26±3°C. Observations for percent disease index (PDI) were made after 8-10 days by adopting 0-4 scale described by Datar and Mayee⁵. The minimum inhibitory

concentration (MIC) of aluminium phosethyl and dosage response curves were calculated by using following equation¹¹:

$$Y = \frac{H}{1 + \text{Exp}(a + bx)}$$

Where, Y= radial growth as percentage of control, H= upper limit of curve, Exp = logarithmic exponent, a = regression constant, b=regression coefficient and X= measured points.

Results and Discussion

The results (Table 1) indicate that out of 15 isolates tested, isolate Pv-1 was highly sensitive (MIC 791.21 µg/ml) while isolate PV-2 to Pv-7 were resistant (MIC 4415.58 to 4669.30 µg/ml). However, some isolates showed MIC between 9002.30 to 18786.68 µg/ml (Pv-8 to Pv-15) were considered as highly resistant to aluminium phosethyl. Among the population, development of resistance to aluminium phosethyl by pathogen was noted in Pv-2 to Pv-7. These were confirmed as resistant isolates among the population. The isolates Pv-8 to Pv-15 were highly resistant to aluminium phosethyl. This shows that there is a tendency towards the development of resistance against aluminium phosethyl in pathogen population. Resistance in *P. viticola* against aluminium phosethyl has been noted by some workers^{4,12}.

Table 2 indicates that 15 isolates

Table 1. Occurrence of resistance in *Plasmopara viticola* to aluminium phosethyl.

Isolate	MIC ($\mu\text{g/ml}$)
PV-1	791.21
PV-2	4398.60
PV-3	4415.58
PV-4	4586.60
PV-5	4658.01
PV-6	4667.31
PV-7	4669.30
PV-8	9002.30
PV-9	9041.49
PV-10	9169.04
PV-11	9406.30
PV-12	9588.99
PV-13	13644.58
PV-14	14912.60
PV-15	18786.68

* MIC - Minimal inhibitory concentration.

Table 2. Aluminium phosethyl resistance in *Plasmopara viticola* isolates from Maharashtra.

No. of isolates	MIC ($\mu\text{g/ml}$)	Resistant factor	Resistance category	Percentage of isolate
1	791.21	1	Sensitive	6.66
6	4415.58 to 46469.30	5.58 to 5.90	Resistant	40.00
8	9002.30 to 18786.68	11.37 to 23.74	Highly resistant	53.33

of *P. viticola* varied the range of sensitivity. These resistant factor 1 to 23.74, classified under resistance category as per FRAC (Fungicide Resistance Action Committee). This work is in agreement with the work of few workers^{4,7,8}. There are certain report that *Gloesporium ampelophagum* is resistant against carbendazim^{9,14,15}. The results indicate that *P. viticola* under high selection pressure of aluminium phosethyl leads to the development of resistant in *P. viticola*, the downy of grapes. The management will be reported elsewhere.

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