

 <p>ISSN NO. 2320-5407</p>	<p>Journal Homepage: - www.journalijar.com</p> <p>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)</p> <p>Article DOI: 10.21474/IJAR01/4517 DOI URL: http://dx.doi.org/10.21474/IJAR01/4517</p>	 <p>INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR) ISSN 2320-5407 Journal homepage: http://www.journalijar.com Journal DOI: 10.21474/IJAR01</p>
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RESEARCH ARTICLE

EFFICACY OF BENOMYL AGAINST *FUSARIUM OXYSPORUM* F. *CONGLUTINANS* CAUSING YELLOW OF KOHLRABI.

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Manuscript Info

Manuscript History

Received: 18 April 2017

Final Accepted: 20 May 2017

Published: June 2017

Key words:-

Fusarium oxysporum. f.conglutinans,
kohlrabi, MIC

Abstract

There was variation in minimum inhibitory concentration (MIC) of benomyl among the 14 isolates *Fusarium oxysporum. f.conglutinans* (Wr.) Synder and Hansen. MIC on CDA plates ranged from 10 µg ml⁻¹ to 230 µg ml⁻¹ and on kohlrabi plant 8 µg ml⁻¹ to 150 µg ml⁻¹. The isolate FOC-11 was highly resistant and isolate FOC-3 was highly sensitive.

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Introduction:-

Kohlrabi (*Brassica oleracea* var. *gongylodes* L.) is an important vegetable crop grown in southern and northern part of India. Kohlrabi or Knol-khol or German turnip is a stout, round, tuberous, enlarged portion of stem. Kohlrabi is a perennial, cool season vegetable. It can be eaten raw as well as cooked. Leaves of kohlrabi are also edible. It is good source of minerals, vitamins and dietary fibers and negligible amount of fat and zero cholesterol. Leaves are very nutritious and rich in carotenes, minerals and vitamins A, K, C, and B- complex group. Kohlrabi is recommended to the patients of asthma and bronchitis. It is used to recover various diseases like liver diseases, stones in the urinary gallbladders, hemorrhoids, colitis, painful menstruation and anemia, cough, gout, rheumatism, arthritis, sciatica. Leaf juice is an excellent tonic for growing children.

This vegetable suffers from 'yellows of Kohlrabi' caused by *Fusarium oxysporum f. conglutinans*. The disease identified by yellowing, browning and withering of the leaves which progresses up in the plant. The first and most apparent symptom is dull green color of the leaves in the seed bed or in the field within a month after transforming. Young plant may be stunted, turn yellow and die rapidly. The lower leaves develop curling. The stem twisted towards one side.

Disease plants infected with *Fusarium oxysporum f. conglutinans* were collected from different localities of Maharashtra and Karnataka. (Belgum, Kolhapur, Sangli, Satara and Pune) in sterile polythene bags and were brought to laboratory. Fourteen isolates were obtained from these samples. These isolates were maintained on Czapek Agar medium. *In vitro* MIC of benomyl against 14 isolates was determined by food poisoning technique both *in vitro* and *in vivo*. (Dekker and Glelink, 1979). Plates were prepared with Czapek dox agar medium along with different concentrations of benomyl. Each fungal isolate was tested at different concentration of benomyl. The six day old culture was cut into 6 mm disc using cork borer and was placed on center of agar plate. These plate maintained under triplicate. Plates without fungicide served as 'control'. Plates were incubated for six days and linear growth of *Fusarium oxysporum f. conglutinans* was measured at different time intervals.

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In vivo sensitivity of *Fusarium oxysporum f. conglutinans* to benomyl was tested on Kohlrabi plants. For this experiment, healthy kohlrabi plants (60 days old) were used. These treated plants were inoculated with 50 ml mycelial or spore suspension. This spore suspension was prepared using 6 day old culture of pathogen, in sterile distilled water and these suspension were poured in pot containing 3 plants. Percentage of infection was recorded after 7 days by 0-4 scale (Kareem2007). Plant without treatment served as 'control' and plant without any treatment inoculation served as 'absolute control'.

Table 1:- MIC of benomyl against *Fusarium oxysporum f. conglutinans* isolates causing yellows of kohlrabi (*in vitro* and *in vivo*)

Sr. No.	Locality	Isolate	<i>In vitro</i> (μgml^{-1})	<i>In vivo</i> (μgml^{-1})
1	Belgaum	FOC-1	30	30
2	Sulaga	FOC-2	15	10
3	Muchandi	FOC-3	10	8
4	Kangrali	FOC-4	15	25
5	Bagewadi	FOC-5	100	70
6	Nesari	FOC-6	75	50
7	Amroli	FOC-7	25	15
8	Sangali	FOC-8	25	15
9	Shindewadi	FOC-9	50	35
10	Kesurdi	FOC-10	100	75
11	Kudal	FOC-11	230	150
12	Mangoan	FOC-12	150	80
13	Shevalwadi	FOC-13	25	12
14	Jejuri	FOC-14	50	50

There was variation in MIC of benomyl among the 14 isolates of *Fusarium oxysporum f. conglutinans* MIC on Czapek dox agar medium range from 10(μgml^{-1}) to 230(μgml^{-1}) and on kohlrabi plants ranges from (8 μgml^{-1} to 150 μgml^{-1}). FOC-3 was sensitive isolate while FOC-11 was resistant.

Many workers had reported benomyl resistance in different species of *Fusarium* (Thanassopoulous et al., 1970; Magie and Wilfret, 1974; Bollen, 1983; Molnar et al., 1985; Yasuda, 1986; Wada et al., 1990; Kamble and Gangawane, 1994 and Bhale, 2002).

Sensitivity of 14 isolates of *Fusarium oxysporum f. conglutinans* to benomyl from different localities showed variation when examined in *in vitro* and *in vivo*. Isolate FOC-3 was sensitive and FOC-11 was highly resistant to benomyl. *In vitro* MIC ranges from 10 (μgml^{-1}) to 230 (μgml^{-1}) and on kohlrabi plants ranges from (8 μgml^{-1} to 150 μgml^{-1}).

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