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## Integrated disease management of *Alternaria* leaf blight in bottle gourd under Semi arid conditions in Rajasthan

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**Abstract**

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl] is a commonly grown vegetable crop in India, which is also grown in Ethiopia, Africa, Central America and other warmer regions of the world. It is widely grown on open fields as well as in river beds throughout the year. It is also suitable for cultivation in hot dry areas. The fruits can be used for juice, as a vegetable or for making sweets. As a vegetable, it is easily digestible, even by patients. *Alternaria* leaf blight found to cause serious losses in bottle guard crop throughout Rajasthan and other states. Characteristic symptoms first appear as small; circular and light to reddish brown spots, which latter enlarge in a concentric manner. Lesions often coalesce to form larger necrotic areas and in the centre of the spot, olivaceous sporulation occurs. The field trial was conducted during Kharif season of 2015 and 2016 at RARI, Durgapura for the integrated disease management of *Alternaria* leaf blight in bottle gourd through different means and combinations among seven treatments. The minimum disease incidence (10.9%) and maximum yield (337.9 q/ha) were observed in treatment T<sub>5</sub> (T<sub>0</sub>+ Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after germination followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval) while maximum disease incidence (34.57%)and minimum yield (235.9 q/ha)were observed in treatment T<sub>7</sub>(Control).

**Keywords:** Integrated disease management, *Alternaria* leaf, bottle gourd

**Introduction**

Bottle gourd [*Lagenaria siceraria* (Mol.) Standl] is a commonly grown vegetable crop in India, which is also grown in Ethiopia, Africa, Central America and other warmer regions of the world. It is widely grown on open fields as well as in river beds throughout the year. It is also suitable for cultivation in hot dry areas. The fruits can be used as a vegetable or for making sweets. As a vegetable, it is easily digestible, even by patients (Thamburaj and Singh, 2000). It is gaining importance due to its high yield potential, steady market price throughout the season. The fruits contain 0.2% protein, 2.9% carbohydrates, 0.5% fat and 11 mg of vitamin C per 100 g fresh weight (Aykroyd, 1963). It also has wide medicinal properties such as laxative, digestive and to prevent constipation. The crop is attacked by a number of diseases such as *Alternaria* leaf blight, *Cercospora* leaf spot, powdery mildew, downy mildew and anthracnose, amongst which *Alternaria* leaf blight caused by *Alternaria cucumerina* (E. & E.) Elliot is found to cause serious losses throughout Rajasthan and other states. Characteristic symptoms first appear as small, circular and light to reddish brown spots, which latter enlarge in a concentric manner. Lesions often coalesce to form larger necrotic areas and in the centre of the spot, olivaceous sporulation occurs. So far, information available on disease management of *Alternaria* leaf blight of bottle gourd under hot arid condition is scanty. Keeping in view, the present study was undertaken to aware the management of *Alternaria* leaf blight of bottle gourd in under Semi arid Conditions in Rajasthan.

**Materials & Methods**

The field trials were conducted during rainy season of 2015 and 2016 at Rajasthan Agricultural Research Institute, Durgapura, Jaipur Pathology in vegetable Block.

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A bottle gourd variety 'Pusa naveen' was sown on Kharif of both the years in the field in Randomized Block Design with three replications for integrated management of *Alternaria* leaf blight of bottle gourd through botanical, fungicides, Insecticide and their different combinations. Seventeen treatments such as T0: Growing of two rows of maize as border crops and use of agri silver mulch sheet. T1: T0 + Seed treatment with Seed Pro @ 25 g/kg and soil drenching of Seed Pro @ 5% at 1st true leaf stage after germination followed by 5-6 spray of Seed Pro (1%) at 10 day interval in rotation with Neem oil (0.2%) alternatively after 15 days after drenching, T2: T0 + Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% at 1st true leaf stage after germination followed by 5-6 spraying of Seed Pro (1%) at 10 day interval in rotation with Neem oil (0.2%) alternatively after 15 days after drenching' T3: T0 + Seed treatment with Seed Pro @ 25 g/kg and soil drenching of Seed Pro @ 5% 1st true leaf stage after germination followed by spraying of Captan 70% + Hexaconazole 5% WP @ 0.1% followed by spraying of (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by Captan 70% + Hexaconazole 5% WP @ 0.1% followed by spraying of (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval, T4: T0 + Seed treatment with Seed Pro @ 25 g/kg and soil drenching of Seed Pro @ 5% at 1st true leaf stage after germination followed by spray of (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by spray of Tebuconazole 50%+Trifloxystrobin 25% @1g/l followed by Fosetyl-Al @ 0.1%, followed by spray of Tebuconazole 50%+Trifloxystrobin 25% @1g/l followed by spray of (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval T5: T0 + Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after germination followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval, T6: T0 + Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after germination followed by spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by spraying of Captan 70% +Hexaconazole 5% WP @ 0.1% followed by Fosetyl-Al @ 0.1% followed by spraying of Captan 70% +Hexaconazole 5% WP @ 0.1% + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 30 days after drenching and T7: Control were taken for this study. Seed treatment (ST) was done before sowing of bottle gourd crop. *Alternaria* leaf blight was observed in the field during both the years. Isolation was made in the laboratory. Small bits with typical disease symptoms of infected leaves along with healthy tissues were cut with the help of sterile blade, surface sterilized with 0.1% mercuric chloride for 30 seconds followed by three washing with sterilized water and plated aseptically in the Petri plates containing 2% Potato Dextrose Agar (PDA) Medium and incubated at 25±10C for seven days. Pathogenicity was established on healthy plants of bottle gourd variety 'Pusa Naveen'. The percent data were angular transformed and statistically analyzed in RBD.

## Results and Discussion

Data on disease incidence of *Alternaria* leaf blight are presented in table 1. All the treatments were found superior than control in case of disease incidence. *Alternaria* leaf blight was found with ranging from 10.90 to 34.37 disease incidence. Among 7 treatments, minimum disease incidence was observed in treatment T5: (T0 + Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after germination followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval) with maximum yield (337.90Q/ha). Treatment T5 and T4 are Statistically at par each other.

The next best treatments was observed T6 (T0 + Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after germination followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval.) with yield (328.50) and maximum disease incidence was observed in treatment T7(34.37) with minimum Yield(235.90). Dushyant *et al.*, (2014) [2] found in the field that carbendazim + mancozeb was the most effective treatment for management of early blight of tomato (*Alternaria solani*) with the minimum disease severity of 8.2%, followed by mancozeb and iprodione + carbendazim with disease severity of 11.4% and 15.2%, respectively. Maheshwari *et al.* (2017) [4] also reported that combined treatment of carbendazim (Seed treatment) @ 0.1% + mancozeb (Foliar spray) @ 0.25% + *Pseudomonas fluorescens* (Foliar spray) @ 5.0% + neem leaf extract (Foliar spray) @ 5.0% was found the most effective with minimum disease incidence of 9.25%, minimum disease severity of 7.07% and maximum disease control (78.23%),

**Table 1:** Integrated Disease Management *Alternaria* Leaf Blight package for Bottle gourd

Treatments	PDI ( <i>Alternaria</i> leaf blight) (φ)	Yield Q/ha,
T1	22.73	274.60
T2	20.00	287.20
T3	14.27	313.30
T4	15.88	302.7
T5	10.90	337.90
T6	11.51	328.50
T7	34.37	235.90
SEM ±	0.59	5.084
CD 5%	1.69	17.59

## Conclusion

It is concluded that *Alternaria* is a destructive pathogen causing a widespread destruction in vegetables. But it becomes easier to control this cosmopolitan fungus. Keeping in mind, it is advisable to the growers to manage *Alternaria* leaf blight disease of bottle gourd by adopting management measures of combine treatments (T<sub>0</sub>+ Seed treatment with carbendazim 12%+ mancozeb 63% @ 3 g/kg and drenching of Captan 70% +Hexaconazole 5% WP @ 0.1% 15 days after

germination followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% followed by spraying of Tebuconazole 50% + Trifloxystrobin 25% @1g/l + spray with (Imidacloprid 17.8 SL @ 7.5 ml/ 15 l + Neem oil 0.2%) followed by Fosetyl-Al @ 0.1% at 10 days interval) This disease may attain an alarming status and may wreak havoc in bottle gourd growing areas if not taken care well in time. Therefore, it is need of the hour to know effective management strategy against this dreaded disease of the crop.

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