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Bio-efficacy and phytotoxicity study of "Ramban" (A Plantb extract) against powdery mildew of mango caused by *Oidium mangiferae*

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Abstract
The uncontrolled use of chemical fungicides has created different types of environmental and toxicological problems. The popularity of botanical pesticides is once again increasing and some plant products are being used globally as antimicrobials against powdery mildew of mango due to their relatively safe status and wide acceptance by the consumers. The plant product "Ramban" (extract of forest herbs) at 0.1 was tested against powdery midew of mango caused by *Oidium mangiferae* at Regional Fruit Research Station, Vengurle. From experiment it is found that, "Ramban" (0.1 conc.) with 26.57 percent disease incidence was effective in controlling the powdery mildew disease as compare to control in which 36.57 per disease incidence was observed.

Keywords: bio-efficacy, phytotoxicity, powdery mildew ramban plant extract

1. Introduction
Mango (*Mangifera indica* Linn) is the most important fruit of India and is known as "King of fruits". The fruit is cultivated in the largest area i.e. 2,312 thousand ha and the production is around 15.03 million tons, contributing 40.48% of the total world production of fruits. The main mango producing states in India are Uttar Pradesh, Andhra Pradesh, Karnataka, Bihar, Gujarat, Tamil Nadu and Maharashtra Total export of mangoes from India is 59.22 thousand tons, valuing Rs. 162.92 crores during 2010-11. India exports mango to over 40 countries worldwide. The major importing countries of India's Mangoes during the period of 2010-11 were UAE (61.79%), Bangladesh (11.41%), UK (8.92%), Saudi Arabia (3.79%), Kuwait (2.32%), and Bahrain (2.19%) respective. Konkan region accounts for about 10 per cent of the total area under mango in the whole country out of which almost 95 per cent area is covered by the choicest mango cultivar 'Alphonso' which is locally called as 'Hapus' with a major export share to the tune of over 35 per cent. Powdery mildew of mangoes (*Mangiferae indica* L.) is widespread throughout most of the mango growing areas. The damage caused by powdery mildew to the inflorescences of mango is often underestimated as disease outbreaks occur early during the flowering stage which is responsible for crop losses up to 80-90 %. Therefore the yield losses occur due to this disease can be minimized by using various control measures. Continuous use of chemical fungicides for the management of powdery mildew disease on mango has led to new problems in addition to solving the existing problem. The chemical pesticides are causing serious problems and more alarming amongst them are pollution of air, water and soil, residual toxicity and development of resistance in the pathogen against chemical, thereby need to apply them frequently with their escalating prices and harmful effects on non-target organisms. The ultimate aim of recent research in this area has been the development of alternative control strategies to reduce dependency on synthetic fungicides. Plants have ability to synthesize aromatic secondary metabolites, like phenols, phenolic acids, quinones, flavones, flavonoids, flavonols, tannins and coumarins (Cowan, 1999) [1]. The components with phenolic structures, like carvacrol, eugenol, and thymol, were highly active against the pathogen. These groups of compounds show antimicrobial effect and serves as plant defence mechanisms against pathogenic microorganisms (Das *et al.* 2010) [2]. At present, we should concentrate on to investigate the use of plant products having antimicrobial properties against the control of plant diseases. It would be advantageous to standardize methods of extraction and to test the efficacy so that the search for new biologically active plant products could be more systematic. In this view the research work was under taken at Regional Fruit Research Station, Vengurle. The plant product "Ramban" was tested against this disease.

2. Materials and methods
The present investigation was carried out at Regional Fruit Research Station, Vengurle on Mango cultivar, Alphonso. The present experiment was laid out in Randomized Block Design with three treatments including one standard check and seven replications. The trees were selected and twenty panicles per treatment per replication were tagged and sprayed at 15 days interval as per the time of schedule and the severity of powdery mildew was recorded by using 0-5 scale at 15 days after last spray. The percent disease incidence was calculated by using following formula.

$$PDI = \frac{\text{Sum of all numerical ratings}}{\text{No. of inflorescences examined x Maximum Disease rating}} \text{ x100}$$

Table 1: Treatment Details (Bio-Efficacy).

Tr. No.	Treatments	Conc.	Application time and Method
T_1	Ramban	0.1	First spray fifteen days prior to flowering flush and subsequent three sprays at fifteen days interval
T_2	Carbendazim (Standard Check)	0.1	
T_3	Control	--	No sprays

To evaluate the phyto-toxicity of Ramban, a separate trial was carried out in mango farm. The phyto-toxicity, if any on mango flowering flush due to spraying of Ramban was observed during the period of experiment. The incidence of phyto-toxic symptoms like epinasty, hyponasty, necrosis, chlorosis and wilting were observed. The observations were recorded at 1, 3, 5, 7 and 10 days after spraying in each treatment. The parameters on phyto-toxicity were observed on the following scale.

0= No phyto-toxicity, **1**= 1-10%, **2**=11-20%, **3**=21-30%, **4**=31-40%, **5**= 41-50%, **6**= 51-60%, **7**= 61-70%, **8**= 71-80%, **9**= 81-91% and **10** = 91-100%

3. Result and discussion

A field trial was conducted to assess the bio efficacy of Ramban. The disease pressure was uniform on the crop in all the treatments before spraying. Data presented in table.2 revealed that Ramban was found effective against powdery mildew. Treatment of Carbendazim at (0.1%) concentration which was only used as a standard check for comparison against Ramban recorded significantly less incidence with 11.42 percent over control (36.57%). This was followed by treatment of Ramban (0.1%) which showed 26.57 per cent disease severity which was found significantly superior over control. The concept of organic farming and eco-friendly management encouraged the plant protection specialists to go for the use of plant extracts for the management of pest and diseases. This can also avoid the pollution of air, water and soil. Use of chemicals has been discouraged. Plant extracts which were previously known for their antifungal and antibacterial nature were evaluated against different powdery mildews. The present results are in confirmation with results observed by several previous workers such as, Karande and co workers (2017) [3] who stated that different bio chemicals *viz.*, neem oil, soap nut seed extract and Vavding seed extract were found effective in control of *Odium mangiferae*. Rajapakse *et al* (2006) [4] who reported that botanicals *viz.*, Neem seed extract, (0.5%) and Neem oil (0.3%) were found effective in controlling the powdery mildew of Rambutan (*Nephelium lappaceum* L.) caused by *Oidium nephelii*. Shabeer Ahmad and Irfan ud Din (2006) [5] opined that inhibitory action might be due to the presence of sulphur containing compounds *viz.*, Nimbicidin, Azadirachtin in *Azadirachta indica*.

As per phytotoxicity concerned (Table 3) from data it was observed that, Ramban at the 0.1% concentration did not have any phyto-toxic effect on mango. The flowering flushes were healthy at different growth stages after the spraying therefore, the treatments were safe to mango at the above referred concentration. Hence it may be concluded that Ramban is a safe to use on mango up to the dose of 2ml /liter concentration.

Table 2: Bio-Efficacy of Ramban against powdery mildew disease of Mango

Tr. No	Treatments	Conc. (%)	Percent Disease Incidence (PDI)
TT_1	Ramban	0.1	26.57 (30.99)
TT_2	Carbendazim (standard check)	0.1	11.42 (19.73)
TT_3	Control	--	36.57 (37.20)
	SE +	**--**	**0.560**
	CD at 5%	**--**	**1.727**

* Figures in parenthesis indicated Arc sin Transformation.

Table 3: Phtotoxicity of Ramban at 1,3,5,7 and 10 days after spraying in Mango.

Sr. No.	Phytotoxicity (%)	Ramban@ 0.1%
1	Epinasty	Nil
2	Hyponasty	Nil
3	Necrosis	Nil
4	Wilting	Nil
5	Chlorosis	Nil

4. Summary and conclusions

Mango is one of the important fruit crop in Kankan region of Maharashtra state. The lower productivity in mango is mainly attributed to low yield potentiality due to biotic and abiotic stresses. Among biotic stresses powdery mildew caused by *Oidium mangiferae* which is particularly severe in Konkan region under favourable condition and variation and irregularity in flush. To avoid residual problem of chemical fungicides in management of this diseases studies bio efficacy of Ramban plant product were carried out and the results obtained are summarized here. A field trial was conducted to assess the bio efficacy of Ramban against the powdery mildew. Ramban at 0.1 per cent concentration with 26.37 per cent disease severity was most effective in managing the disease as compare to control.

5. References

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