

## TRIALS CARRIED OUT AT BCRL WITH YEA!-ODC

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### Summary

#### Objectives:

1. Evaluation of YEA!-ODC against soil and air borne fungal pathogens
2. Studies on the effect of YEA!-ODC against sucking pests
3. Observations on phytotonic properties of YEA!-ODC

#### Experiments Conducted:

1. In vitro studies on contact toxicity of YEA!-ODC against *Sclerotium rolfsii*
2. Blotter test to evaluate the efficacy of YEA!-ODC against *S. rolfsii*
3. Pot culture experiment to verify blotter test results
4. Effect of YEA!-ODC application on the phytophagous mite, *Tetranychus urticae*
5. Feeler trials on the efficacy of YEA!-ODC against powdery mildew affecting roses grown under polyhouse conditions
6. Feeler trials on the effect of YEA!-ODC against downy mildew of mulberry

### SUMMARY

YEA!-ODC (Organically derived colloids), a complex of chitin or chitosan, is reported to be devoid of any enzymes, hormones, acids, petro-chemicals or genetically altered materials. It is claimed to increase plant vigor, flowering and yield, water and nutrient uptake and also make plants less susceptible to disease and insect attacks. Keeping this in mind a series of laboratory, pot culture and preliminary field experiments were carried out to evaluate its efficacy against soil and air borne fungal pathogens.

#### Laboratory studies:

As per product literature YEA!-ODC is only effective in an in vivo system by triggering the natural defense mechanism in plants. To confirm this property an in vitro study was conducted to evaluate its effect on the fungal pathogen, *Sclerotium rolfsii*. For this PDA medium was poured at the rate of 100 ml in 2 sets of Petri dishes. Five mm discs of *S. rolfsii* were placed at the centre of one set of Petri plates, while in the second set in addition to the pathogen, 300  $\mu$ l of YEA!-ODC was applied to the media. After 24 hr of incubation, observations were recorded on growth of the pathogen, based on conidial formation and spore germination in both control and YEA!-ODC treated Petri dishes. Results indicated that the pathogen developed uniformly in both sets of Petri dishes, indicating that YEA!-ODC does not have any contact effect on the pathogen.

Before carrying out detailed studies with any product in plant disease management it is an essential pre-requisite to identify its potential through laboratory trials. Keeping this in mind a rapid in vivo (blotter test) trial was carried out to evaluate the efficacy of YEA!-ODC against the soil borne fungal pathogen, *S. rolfsii*. For this surface disinfected seeds of chickpea were first coated with mycelial suspension of *S. rolfsii* @  $2 \times 10^6$  CFU/ml, followed by treatments with different concentrations (1- 3 ml/ lt. of water) of YEA! ODC. One set of seeds were treated with YEA!-ODC alone to determine its phytotonic effect. Observations were recorded on seed germination,

seedling growth and based on these the vigor index was calculated. The studies indicated higher level of (5.12) vigor index in the case of YEA!-ODC treated seeds, as compared to the seeds treated only with the pathogen (1.69). Seeds treated with YEA!-ODC alone recorded a high vigor index of 9.75, indicating the phytotonic property of YEA! ODC. However, the experiment was repeated due to low seed germination, probably on account of longer storage of seeds, in all the treatments.

Results of the second blotter test revealed that although seed germination was normal in all treatments, disease incidence was observed to be the lowest in those treated with YEA!-ODC as compared to 100 percent disease incidence in pathogen check. The vigor index was found to range from 17.10 to 21.00 in seeds treated with YEA! ODC, as compared to pathogen check (9.09). However, the maximum vigor index (24.80) was observed in seeds treated with only YEA!-ODC @ 2ml/ lt of water. It is clear from the results that YEA!-ODC is effective in checking root rot and collar rot caused by *S. rolfsii*.

In the two blotter tests reported above, seeds were first coated with the pathogen before they were treated with YEA! ODC. A third blotter test was carried out to determine whether the YEA!-ODC treatment resulted in washing away of the pathogen when the infested seeds were dipped in the YEA!-ODC solution. In this study the seeds were first treated with YEA! ODC, before inoculating with the pathogen. However, the results were found to be similar to the second blotter test. Relatively higher vigor index (18.90) was obtained in the treatment in which seeds were treated with YEA!-ODC (3ml/ lt of water) + pathogen, as compared to only pathogen treated seeds (8.50), while it was on par with seeds treated with *Trichoderma viride* (16.20).

In all the blotter test experiments, zero per cent disease incidence was noticed with pathogen inoculated seeds, treated with YEA!-ODC as against cent percent death of seedlings treated with pathogen alone.

#### **Pot culture studies:**

The results obtained in blotter tests were further verified by pot culture studies. For this *S. rolfsii* was thoroughly mixed with the pot mixture @ 2g/ 1kg. The pots were watered and left undisturbed for 4 days to permit establishment of the pathogen in the entire quantity of soil filled into the pots. Chickpea seeds were then sown and 3 days after germination, YEA!-ODC @ 1, 2, and 3 ml/ lt of water was applied by soil drenching. Only pathogen inoculated pots were considered as control. Observations were recorded on seed germination, and the vigor index were recorded 10 days after seed germination.

Seed germination was found to be normal (80-100 %) in all the treatments including only pathogen inoculated pots. However, 10 days after seed germination none of the seedlings were noticed to survive in pathogen only inoculated pots, as against 56 percent seedling survival in YEA!-ODC+ pathogen treated pots, in spite of very high load of pathogen in the soil.

Another pot culture experiment was conducted by following similar

methodology as mentioned above, but with a much lower pathogen load. In this study seeds were coated with pathogen and sown, instead of soil incorporation. Very low (3.30-3.80) disease incidence was noticed in YEA!-ODCtreated seedlings, as compared to only pathogen treated seedlings (73.30) even one month after seed germination.

Preliminary studies were also carried out on the effect of YEA!-ODCtreatment on the population build up of the phytophagous mite, *Tetranychus urticae* on French beans. For this YEA!-ODCwas applied as seed treatment, soil drenching and known numbers of mites released at the four leaf stage, followed by YEA!-ODCapplication as soil drenching. Observations on population build up, recorded 12 days after infestation, indicated that although the mites multiplied on YEA!-ODCtreated plants, their population growth was 50 per cent lower on treated plants when compared with control. These studies are being repeated by keeping the plants in open sunlight throughout the duration of the study, since the growth was found to be affected when the plants were retained under laboratory conditions after release of the mites.

#### **Field evaluation:**

Feeler trials were carried out on the effect of YEA!-ODCin the management of powdery mildew affecting roses grown under polyhouse conditions. For this YEA!-ODCwas applied as both soil drench and foliar spray @ 3 ml / lt of water on powdery mildew affected plants. The disease incidence before YEA!-ODCtreatment was found to range between 60-70%. A total of 2 applications of YEA!-ODCwere made with a gap of 7 days. Ten days after the second application of YEA!-ODCthe disease incidence was found to be 8.7% and 10.49% respectively in soil drenching and foliar spray treatments, against 5.7 % in fungicide treated plants (13 application during the course of study). No incidence of the disease was noticed on fresh foliage.

Similar results were also recorded in downy mildew infected Mulberry plants after YEA!-ODCtreatment (soil drench @ 3 ml / lt of water). Disease incidence in YEA!-ODCtreated plants was on par with fungicide treated plants, ten days after the treatment.

Since untreated control was not included in both the field experiments, it is difficult to conclude whether the reduction in disease incidence in YEA!-ODCtreated plants was due to treatment effect or climatic factors, as incidence of powdery and downy mildew are highly dependent on weather conditions. It was not possible to convince the farmers to provide beds for retaining as non-treatment control in the initial stage. After gaining confidence on the efficacy of YEA!-ODCtreatment both the rose and mulberry farmers have agreed for extensive field trials, besides providing beds for non-treatment control. These studies are proposed to be initiated shortly. Based on the positive results obtained in the above field trials, feeler trials have also been initiated in a gherkin fields, for control of downy mildew.

#### **Conclusion:**

Although YEA!-ODCis recommended for use as a prophylactic application, our studies involved application on disease infested plants. Nevertheless, the results of the studies have been very promising and it can be concluded that YEA!-ODChas a good potential in the management of aerial fungal diseases, which are major limiting factors in

the cultivation of a number of field and horticultural crops.

## Chitin/Chitosan Evaluation & Comparisons

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