

In vitro compatibility between *Metarhizium anisopliae* var. *acridum* and Neem seed oil.

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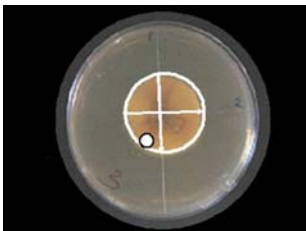
Nymph of the tree locust (photo M.H. Luong-Skovmand, CIRAD)

The tree locust *Acridium melanorhodon* (Walker) in Sudan is considered - by far - the most destructive pest to *Acacia senegal* or (Hashab tree) from which the superior gum arabic is produced. The control of Tree locust, as well as the other locusts, is very concerned by the global ecological campaign against chemicals which drive forces behind changes in locust control policies. The entomopathogenic fungus *Metarhizium anisopliae* var. *acridum* (*Deuteromycotina: Hyphomycetes*) strain IMI 330189, and Neem seed oil *Azadirachta indica* A. Juss. are potential alternative biocontrol agents. In the present study, the compatibility of their mixture has been evaluated under laboratory conditions.

Method Two sets of experiments were conducted to evaluate the survival range of *M. anisopliae* in different concentrations of Neem oil regarding the fungus vegetative growth and conidia production. Water, diesel and ground nut oil dilutions of *M. anisopliae* were inoculated into Petri dishes containing semi-synthetic media + chloramphenicol (SSM+C) with 0%, 0.5% and 1% Neem oil concentrations and incubated for 10 days at two temperatures 20°C and 34°C according to the minimum and maximum temperatures in our field study area in the Sudan. Higher Neem concentrations were tested in the second experiment which consists of two fungus dilutions (water and diesel) into 7 Neem concentrations (0%, 0.5%, 1%, 1.5%, 2%, 2.5% and 3%) using the same medium at temperature 28°C. Fungus vegetative growth and conidia production were the basis for characterization. Both were submitted to the classification model for products compatibility *in vitro* [T] proposed by Alves *et al* (1998).



Metarhizium anisopliae var. *acridum* in the abdomen of a locust (photo Vicentini and Magalhães, Embrapa)



Compatibility calculation :
 $T = [20(VG\%) + 80(SP\%)]/100$
(VG : vegetative fungal growth; SP: evaluation of conidial production)



Azadirachta indica A. Juss.
(photo M. Arbonnier, CIRAD)



Results At 28°C, all Neem concentrations below 2% were compatible with *M. anisopliae* and the concentrations 2% and 2.5% were moderately toxic, whereas at 20°C, 1% Neem was toxic to *M. anisopliae* when diluted in diesel and very toxic when diluted in water. On the other hand, at the higher temperature of 34°C all the tested concentrations were compatible with *M. anisopliae*. Generally, the fungus vegetative growth was more affected by Neem oil than the conidia production.

Treatments (Neem conc.)	20°C			34°C		
	Sporulation %	T value	Classification	Sporulation %	T value	Classification
Oil 0%	23.2	36.8	T	23.5	37.4	T
Oil 0.5%	80.1	81.6	C	78.8	83.2	C
Oil 1%	71.7	74.3	C	74.1	78.1	C
Diesel 0%	71.0	75.7	C	70.4	75.3	C
Diesel 0.5%	158.1	144.3	C	159.3	145.2	C
Diesel 1%	13.6	31.7	T	13.7	30.2	C
Water 0%	100.0	100.0	C	100.0	100.0	C
Water 0.5%	107.7	102.2	C	111.1	108.6	C
Water 1%	10.3	25.8	VT	3.7	103.7	C

C = Compatible

T = Toxic

VT = Very toxic

Neem concentrations	Water			Diesel		
	T value	Sporulation %	Classification	T value	Sporulation %	Classification
0.0%	100	100.0	C	98	99.1	C
0.5%	87	85.6	C	75	70.3	C
1.0%	86	87.4	C	118	128.1	C
1.5%	65	61.3	C	72	69.4	C
2.0%	44	37.8	T	47	41.4	MT
2.5%	49	44.1	MT	31	21.6	T
3.0%	31	22.3	T	38	31.5	T

C = Compatible

MT= Moderately toxic

T = Toxic

T values and compatibility classification of the different concentrations of neem oil with *Metarhizium anisopliae* diluted in diesel, groundnut oil and water, cultured in SSM+C at temperatures 20°C and 34°C.

T values and compatibility classification of the different concentrations of neem oil with *Metarhizium anisopliae* diluted in diesel and water, cultured in SSM+C at temperatures 28°C.

The study concluded that Neem oil concentration in the mixture can be increased up to 1.5% with no deleterious effect on the fungus. Hence *M. anisopliae* and Neem could be mixed and used for locust control.



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