

Further developments in the slow release system of EPN

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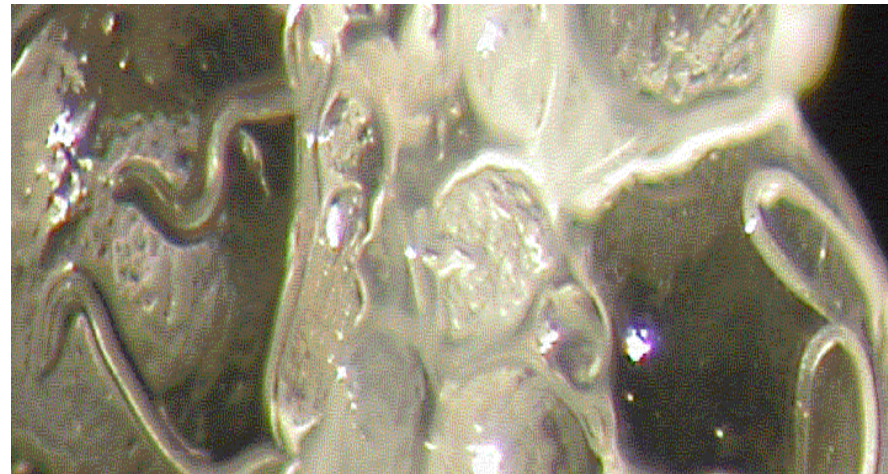


OVERALL OBJECTIVES

to avoid loss of nematodes during the application and establishment period

to allow easy use of EPN, e.g. application together with the seed drilling or fertilizer placement

to develop a simple delivery system of augmenting nematodes



BACKGROUND



Excellent when applied in high dose with watering can at the right time

Slow-release nematode delivery system ('NemaBag') yielded disappointing control results in first field trials.

Greenhouse experiments : To understand and to overcome the problem in nematode efficiency when applied via NemaBags



- test parameters did influence nematode efficiency (organic fertilizer, and synthetic fertilizer, plant)
- nematode efficiency was lowered by about 40%
- nematode emergence from the bag occurred in short period, within 7days (nematodes could spread, and die)

AIM OF THE PRESENT EXPERIMENT

- Improve the NemaBag system by delaying the time of nematodes' emergence from the bags

This would:

- Keep the nematodes alive at the right place until pests are available
- Avoid loss of nematodes during the establishment period, allowing the application of lower numbers of IJ (more cost effective)

EXPERIMENTAL DESIGN

A. Greenhouse

A.1. Controlled conditions

1. NemaBag-larva-OSR
2. Larva-NemaBag

A.2. Outdoors conditions

Larva-NemaBag



B. Laboratory

B1. Smaller granules

1. Larva-NemaBag

B2. Bigger granules

1. Larva-NemaBag

B3. Vermiculite

1. Vermiculite-larva

B4. Double NemaBag

1. Bag in bag

B5. Bags in Petri dish in water

1. Small granules with greater volume of water
2. Small granules with lesser amount of water



EXPERIMENTAL DESIGN: **A** and **B**

A. Greenhouse

A.1. Controlled conditions

1. NemaBag-larva-OSR
2. Larva-NemaBag

Temperature: room temperature

A.2. Outdoor

1. Larva-NemaBag

Temperature range: 10°- -4°

Sample checking: every 7 days

Distance from larvae to NemaBag: 6 cm

Number of nematodes per bag: 1500 (150 000 Nematodes/m²)

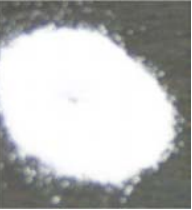


EXPERIMENTAL DESIGN: **A** and **B**

B. Laboratory

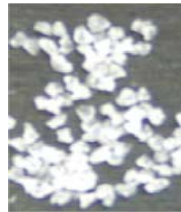
B.1. Smaller granules

1. Larva-NemaBag



B.2. Bigger granules

1. Larva-NemaBag



B.3. Vermiculite

1. Vermiculite bag-larva



B.4. Double NemaBag

1. Bag in bag



Sample checking: every 7 days

Distance from larvae to NemaBag: 6 cm

Number of nematodes per bag: 1500 (150 000 Nematodes/m²)

EXPERIMENTAL DESIGN: **A** and **B**

B. Laboratory

B.5. Bags in Petri dish in water



1. Gel powder mixed with greater volume of water
2. Gel powder mixed with lesser volume of water



- Sample checking: every day for a three days
- Number of nematodes per bag: 1500

RESULTS: A. Greenhouse

Mortality caused by nematodes:

A.1. Controlled conditions (1. NemaBag-larva-OSR, 2. Larva-NemaBag)

A.2. Outdoors (1. Larva-NemaBag)

	7th day	14th day	21st day
A.1.1.	0%	83%	100%
A.1.2.	0%	34%	100%
A.2.1.	0%	0%	0%

After larvae died, they were removed and replaced by new larvae

RESULTS: **B. Laboratory**

Mortality: **7th day** **14th day** **21st day**

B.1. Smaller granules	0%	33%	100%
B.2. Bigger granules	0%	100%	85%
B.3. Vermiculite	0%	100%	100%
B.4. Double NemaBag	0%	75%	100%

- After larvae died, they were removed and replaced by new larvae
- **Number of nematodes that infected a single larva were from few up to 30 (dissection)**

RESULTS: B. Laboratory

B.5. Bags in Petri dish in water

1. Gel powder mixed with greater volume of water
2. Gel powder mixed with lesser volume of water

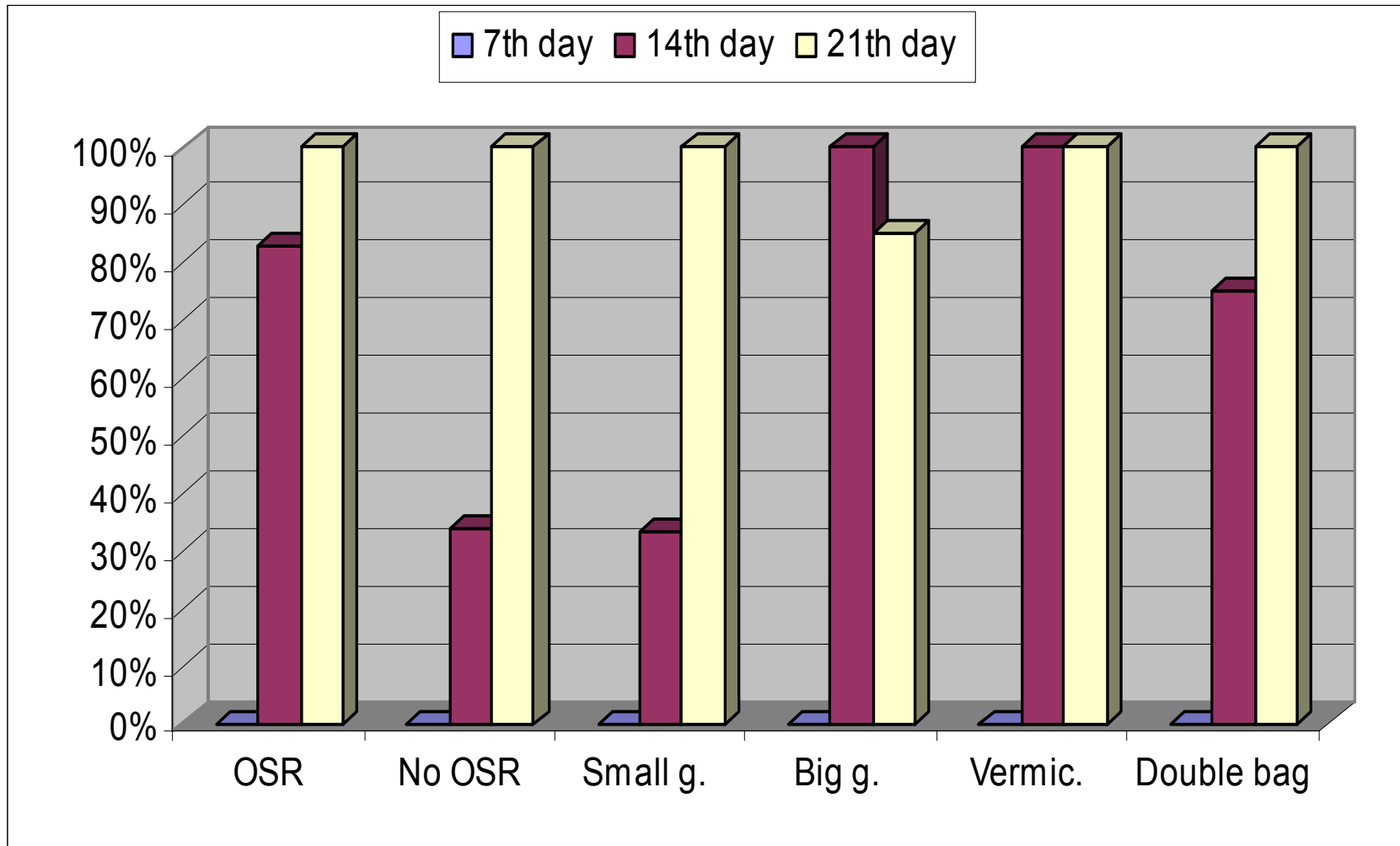
No. of emerged nematodes

	1st day	2th day	3rd day
B.5.1.	4%	3%	0.6%
B.5.2.	3%	0.3%	0.2%

Total 1: 7.6%

Total 2: 3.5%

Results form Greenhouse and laboratory



Number of nematodes in bags after one month

A. Greenhouse

AVERAGE

RANGE

A.1. Controlled conditions

1. NemaBag-larva-OSR

7.4%

4% -12%

2. Larva-NemaBag

16%

7% - 30%

A.2. Outdoor

1.Larva-NemaBag

34%

14% - 53%

B. Laboratory

B.1. Smaller granules

50%

21% - 66%

B.2. Bigger granules

20%

13% - 35%

B.3. Vermiculite

9.9%

4% - 14%

B4. Double NemaBag

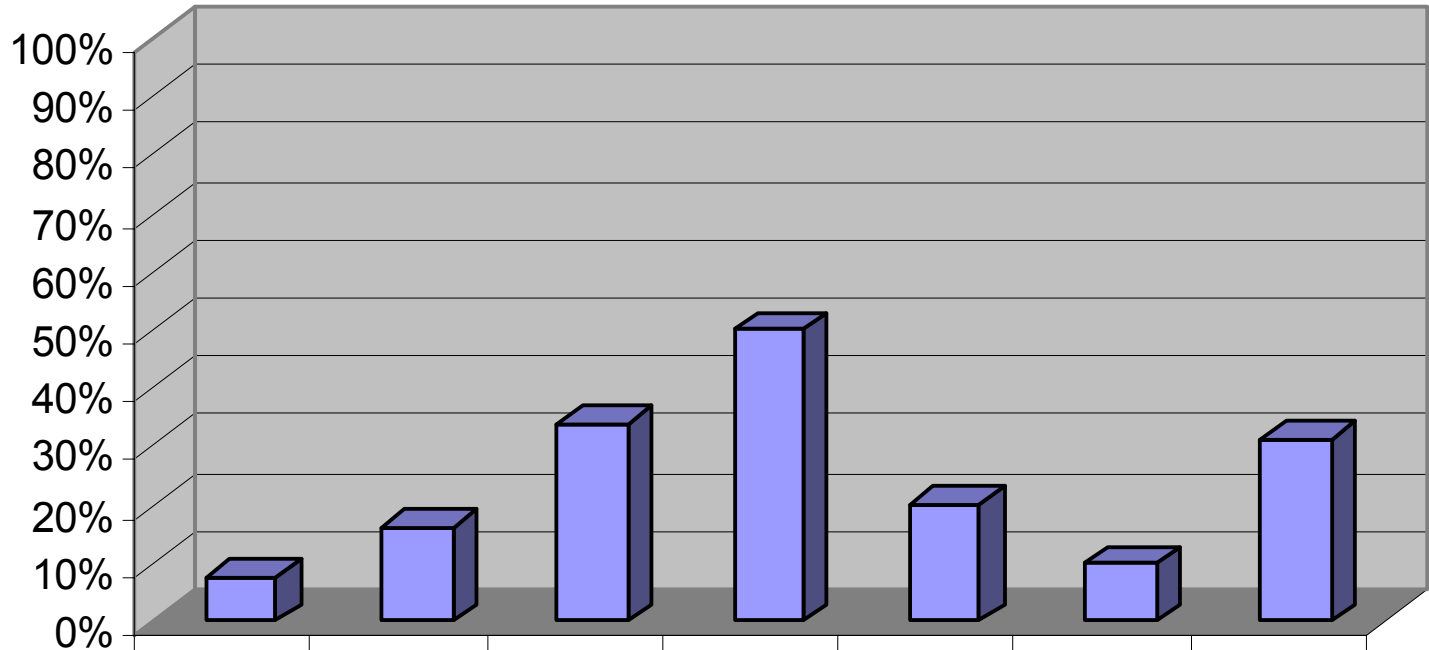
31%

outer-59%

1. Bag in bag

inner- 3%

Number of Nematodes in bags after one month



	OSR	No OSR	Outdoor	Small granule	Big granule	Vermiculite	Double bag
Nema no.	7%	16%	34%	50%	20%	10%	31%

The results showed that:

During the first three days the number of emerged nematodes is very low (not sufficient to kill larvae; unlike first bag material)

Achieved slow(er) release system

(First 7 days larvae were not infected; 14th day relatively high %; 21st day 100% of infestation)

Nematodes could emerge during the period with lower temperature but couldn't infect larvae

The lowest mortality was in case of smaller granules

The highest number of nematodes in bags after one month is with smaller granules (correlated with the lowest mortality)

Nematodes could be applied even more than one month ahead and be released to the soil slowly, starting 14 days after application

We will continue to explore other new, more persistent materials to further delay the release of nematodes at the time desired

Thank you for your attention