

- Continue this until the needle is removed out from the pseudostem.
- Give one application through the feeding hole also.
- Give similar injections at two opposite sides of the pseudostem.

Leaf feeding caterpillars



- Mix thoroughly 10 ml of *Nanma* in one litre of water.
- Spray on the leaves.

Rhizome weevil



- Make cow dung slurry @ 1 kg in one litre of water.
- Add 200 ml of *Nanma* and mix thoroughly.
- Smear a thin layer of the slurry on the rhizome and dry it under shade for 3 days.
- A fortnight after planting, drench its base with *Nanma* @ 20 ml in one litre of water.

Precautions to be followed

- Shake well the solution before use.
- Tightly close the bioformulation bottle immediately after taking the required quantity.
- Test the phytotoxicity of the solution on one leaf and standardize the dose when applied on other crops.
- Spray the bioformulation preferably during the evening hours.
- Keep the formulation out of reach of children



GREEN TECHNOLOGY FOR GREEN ENVIRONMENT: Bioactive Molecules from Cassava Crop Residues



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भाकृअनुप-केन्द्रीय कन्द फसल अनुसंधान संस्थान
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Pests and diseases are one of the major hurdles in achieving food security. The pivotal role played by synthetic pesticides in pest management strategies can never be ignored; nevertheless, injudicious use of agrochemicals posed hazards in multiple ways to man and ecosystem. Realising the adverse effect of chemical pesticides, there is a global drive for the search of befitting alternatives to synthetic pesticides. The century old practice in mitigating biotic challenges using plant products has immense relevance now to keep the pests at bay by ensuring the environment clean and safe.

Crop residues of cassava (tapioca), a climate resilient important tuber crop cultivated in tropical and subtropical countries, has now been identified as an important source to extract the insecticidal principles. With the technical support of Vikram Sarabhai Space Centre (ISRO) and financial support of Central and State Governments, Bioformulation Extraction and Formulation Units were designed

and installed at the Bioformulation Laboratory of ICAR- Central Tuber Crops Research Institute (ICAR-CTCRI).



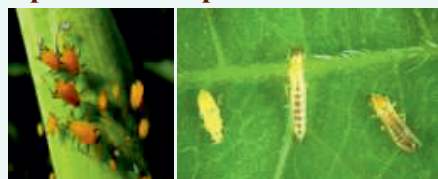
The three bioformulations are named as *Nanma*, *Menma* and *Shreya* have now been widely accepted by the farmers to manage a spectrum of insect pests of agricultural crops of national importance.



Dose and method of application

Important target pests

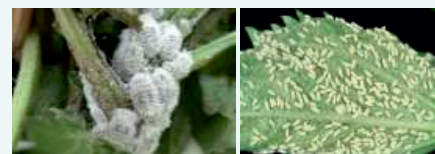
Aphids & Thrips



Mix thoroughly 7 to 10 ml of the bioformulation *Nanma* in one litre

of water. Spray at the infested region.

Mealybugs & Whiteflies



Mix thoroughly 7 to 10 ml of the bioformulation *Shreya* in one litre of water.

Spray at the infested region.

After one week, spray *Nanma* at 5 to 7 ml in one litre of water.

Plants recommended for the treatment:

cassava, papaya, chilly, cow pea, tomato, bitter gourd, snakegourd, ivy gourd, bottle gourd, brinjal and elephant foot yam

Pseudostem weevil in banana



- Cut and remove the dried leaves from 4-5-month-old banana plants.
- Make small incision at the base of leaf axis and squeeze out the accumulated water.

- Mix thoroughly 50 ml of *Nanma* in one litre of water.
- Spray on the pseudostem and last leaf axils.

Spray schedule: Two sprays at 4th & 5th months after planting. Advisable to give one more spray at 6th month for varieties with longer life like *Poovan*, *Quintal Ethan* etc.

Requirement of *Nanma* for one acre (1000 plants): 5 litres

In case of severe infestation, follow trunk injection as described below

Trunk injection against pseudostem weevil

- Draw *Menma* in a 20 ml specially designed syringe.



- Insert the needle approximately 1-2 cm below the infestation point.
- Press the piston gently and release the bioformulation. Withdraw the syringe for about 1 cm and again release the solution.