

Biopesticides: Game-Changers for Health and Income Security in Africa

Precision Integrated Pest Management (IPM) for Smallholder Cowpea Farmers in West Africa

Chemical Pest Control as Practiced by Smallholder Farmers in West Africa is Worrisome

Existing agricultural pest control has formidable challenges:

- Quality of synthetic pesticides on the markets is questionable due to limited regulation and uncertified pesticides resulting from porous national borders.
- Recommended chemical pesticides are unaffordable for most resource-poor farmers.
- Improper handling and spraying practices, such as limited use of personal protective equipment due to its high cost and low availability in rural areas, and are unpleasant to wear in hot and humid tropical climate.
- Health damage to applicators and food consumers from exposure to toxic chemicals (acute and chronic diseases, such as skin and neurological disorders).



A farmer applies pesticides in West Africa, wearing no protective equipment, a dangerous but common practice among resource-poor farmers



Top, biopesticides made from Neem oil and produced in Benin; below, a Neem oil press.

- Environmental damage, such as water pollution and eradicating biocontrol agents and pollinators.
- Documented cases of pests developing resistance to chemicals over time, causing farmers to use chemicals that are even more toxic.

Biopesticides Bring a Radical & Positive Change in the Pest Control Arena

Biopesticides are worth pursuing because they are:

- Produced locally using cheap materials and simple equipment.
- Derived from local plants (e.g. Neem, Jatropha) as well as microorganisms (viruses and fungi).
- Microorganism-based biopesticides are targeted (pest-specific), while plant-based pesticides are more broad-spectrum.
- Both types of biopesticides can easily be combined to make more potent formulations, when needed.
- As effective as conventional pesticides, even better-performing in terms of pesticide resistance.
- Nearly resistance-free, since it is difficult for pests to develop resistance to multiple natural compounds.



l., a parasitic wasp; *ctr.*, a legume pod borer on a cowpea flower; *rt.*, a pod borer caterpillar killed by a specific virus in the field in Niger

Health and Wealth Creation Opportunities from Biopesticides

- Use of biopesticides for food crop protection poses no risks to public health as compared to chemical pesticides.
- Production of biopesticides in Africa can provide additional employment opportunities for women and youth groups.
- High return on investment; e.g. \$1 invested in neem oil biopesticide can yield \$70.

Strong Need for R & D Investment in Biopesticides

- Support from funding agencies concerning research, development, and deployment of local biopesticides is critical to achieving sustainable agriculture in Africa.
- Future research would focus on biopesticide product improvement, new product formulations, and comprehensive value-chain analysis.

Public-Private Partnership Is Key

- Building effective partnerships among research institutions, regulatory institutions, policy makers, and the private sector will be critical for a competitive biopesticide industry.



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Calculation of Return on Investment in Neem Oil Processing, West Africa

According to researchers at IITA-Benin, the purchase and installation of a neem oil press, usually imported from India or China, is \$20,000.

Running at full scale requires 130 MT of neem kernels per year to produce 20,000 liters of neem oil and 60,000 kg of neem cake, which together are worth \$183,000 sales value.

Total running costs, which include the cost of neem kernels, energy, salaries, depreciation and maintenance of infrastructure, and conditioning and packaging of the neem oil, are \$27,000/year. Assuming a conservative lifespan of 10 years for the oil press, the projected cost-benefit ratio on investment is 1:70.