Stories from the Global Call on Agricultural Innovation

Management of insect pest in rice seedbed using a novel rectangular hand net (RHN) for insecticide free seedlings

Bangladesh Rice Research Institute (BRRI)

Bangladesh

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ABSTRACT

A novel rectangular hand net (RHN) was developed to manage insect pests in rice seedbeds, overcoming the limitations of traditional round nets, which can damage seedlings and are less effective in catching insects. The RHN features a 50 cm by 20 cm rectangular frame made of 4 mm GI wire, with a 100 cm plastic pipe handle and an 80 cm mosquito net. The net is used by walking rapidly around the seedbed, sweeping to catch harmful insects while releasing beneficial ones back into the field.

Experiments conducted during the 2021-22 Boro rice season at the Bangladesh Rice Research Institute (BRRI) showed that the RHN performed significantly better than the round hand net, capturing 48.33 pests compared to the round net's 26.67. The RHN caught 80.39% harmful insects and 19.60% beneficial insects. During the Aus 2022 season, the RHN captured 87.78% insect pests and 12.22% natural enemies, while in the Aman season, it captured 71.18% pests and 28.82% natural enemies.

The RHN helps conserve beneficial insects, including predators, parasitoids, and their eggs, nymphs, and adults, which are vital for controlling pests in the main rice field. This technology has eliminated the need for insecticides, promoting sustainable pest control without chemical sprays. The materials to make the RHN are inexpensive and widely available, allowing farmers to construct the net locally. As a result, this approach reduces rice production costs and allows farmers and their families to operate the net easily. The RHN provides a sustainable alternative to insecticide use in rice farming, contributing to better environmental and economic outcomes.

TAPipedia Tags

biodiversity, agricultural innovation, bangladesh, agricultural technologies, green pest control

Other keywords

Rice, insect, Rectangular hand net, Insecticide, biodiversity

Context

I was conducting a demonstration in southern coast area especially Betagi upazila of Barguna district, Barishal division in Bangladesh in Boro season 2021-22. Farmers named Milon Khawlader handed round hand net to farmer Milon Khondoker) of that area suffered insects especially yellow stem borer attacked in his community seedbed.

To control seedbed insect pests, he applied two times insecticides virtaco (Chlorantraniliprole group) and cartap group insecticides even though I supplied to him a round hand net. I asked why you are not using this hand net to control seedbeds stem borer. He said it injured small/tender seedlings after that I visited his seedbeds and identified the actual problem, then started to solve this farmers' problem.

key problems

Insect pests first attacks rice in seedbed generally 7-9 days after sprouted seed sowing. At this early sensitive stage, traditional sweep net (round hand net) is not suitable to collect insects because it injured tender rice seedlings, its insect catching efficiency is also lower than rectangular hand net and difficult to sweep rice seedbed. As a result, farmers spraying two times in seedbeds and beneficial insect (biodiversity) losses.

CHALLENGES ADDRESSED

- *Climate change and disaster risks*
- *Erosion of natural resource base, loss of biodiversity*

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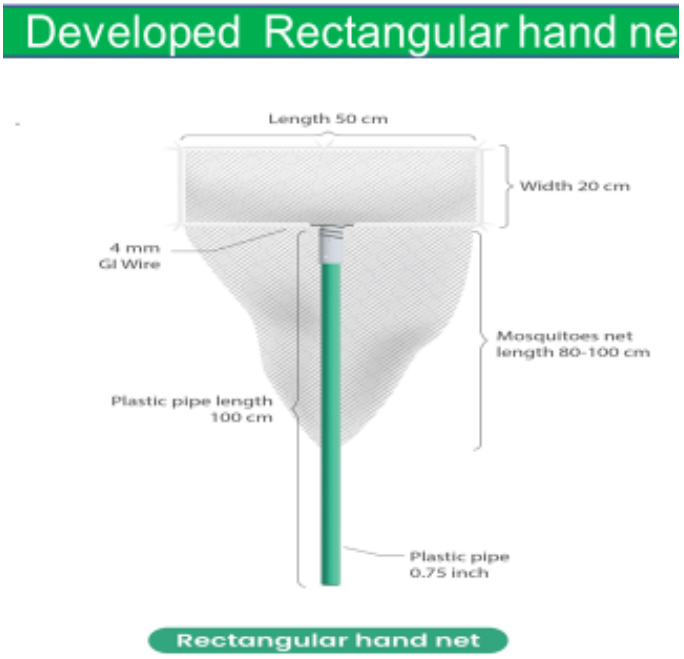
INNOVATIVE SOLUTIONS

The newly developed hand net consists of a rectangular frame that includes 4 mm GI wire, and the frame length and width 50 cm and 20 cm, respectively. It also consists of a plastic pipe that length 100 cm, radius 0.75 inch, and market available white color mosquito net, which length from the frame is 80 cm.

Methods of application is rapidly walking with rectangular hand net around the seedbed (model seedbed one-meter width and length depends on land condition). After sweeping a full seedbed, a harmful insect has been destroyed and beneficial insect released again in the same field.



KEY OUTCOMES AND MEASURABLE IMPACTS ACHIEVED

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To test the performance of this novel sweep net, conducted experiments in Boro, 2021-22 rice growing season at Charbadna farm of Bangladesh Rice Research Institute (BRRI) regional station, Barishal. Fifteen square meter (15m2) seedbeds, RCBD with 3 replications followed at high yielding variety BRRI dhan29, BRRI dhan88, and BRRI dhan89. After each sweeping of individual rice, insect pests and natural enemy counted and recorded manually. RHN performance (48.33) significantly better than round hand net (26.67).

RHN caught less beneficial insects (19.60 %) compared to harmful insect pests (80.39 %). In Aus season 2022, 20 m2 area BRRI dhan48, BRRI dhan98, BRRI dhan85 seedbed tenure caught insect pest (87.78 %) and natural enemy (12.22 %). Same year Aman season BRRI dhan76 and BRRI dhan52 seedbed period insect pest caught (71.18%) and natural enemy (28.82 %). Both seasons conducted this experiment at BRRI, Barishal Charbadna and Sagordi farm. The abundance of predators, parasitoids and parasitism rates increased significantly in insecticides untreated plot than treated plot (Ali et al., 2019).

So, this technology is also conserving beneficial insect, predators, and parasitoids eggs, nymphs, and adults in rice seedbeds that will help to increase beneficial insect, predators, parasitoids in rice main field consequently remained control in harmful insect in main rice field.
This technology reduced up to 100% use of insecticides in BRRI R/S Barishal, Bangladesh research field seedbeds. In farmers field, a farmers Abu Taher, Sorail upazila, Brahmanbaria used this RHN in his seedbeds in Boro season rice BRRI dhan88 variety under supervision of Department of Agriculture (DAE) officials.

Used this RHN farmers was able to produce healthy seedlings without spraying any insecticides (Picture attached below). The materials to make RHN are widely available and cheap, therefore farmers can easily make it locally. Farmers' rice production cost will be reduced, and other family members of the farmer will be able to operate rectangular hand net. As a sustainable technology it may be redundant insecticides spray in rice producing countries (Dhaka Tribune, 2022).

Factors for Success

Farmers in Bangladesh typically depend on chemical insecticides and spend up to Tk 1,000 per acre (10 USD) (a land unit equivalent to 100 decimal) for saving rice seedlings from pest attack in the seedbeds. Official figures put the yearly estimated aggregated cost of insecticides applied to rice seedbeds at Tk50 crore/ 46 million USD. Farmers' health will be secured from insecticides hazards.

The beauty of using the hand net to get rid of harmful insect in rice seedbeds is that it is eco-friendly. Unlike insecticides it does not poison the land and water bodies, fish habitats, etc., and it also helps farmers catch and kill only “enemy bugs” (insects that feed on rice seedlings or damage them) and release “friendly insects” back to nature. Insecticides use will be reduced 80-100% in rice seedbeds.

CRITICAL CAPACITIES

The RHN given satisfactory results in research field and some farmers field demonstration. To reach the farmers' level it's essential to conduct farmers' training and field demonstrations.

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Firstly, conducted this experiment in Aus 2022, Aman 2022, Boro 2021-22 and 2022-23 seasons in Bangladesh Rice Research Institute, Regional Station, Barishal.

Then conducting experiments in BRRI, R/S, Rangpur, Cumilla and Habiganj. Then susscessfully conducted field trial in farmers field at sarail upazila of Brahmanbaria district, agailjhara upazilla of Barishal district, tanore upazila of Rajshahi district and Chandpur district with the help of Agricultural officer of Department of Agricultural Extension (DAE).

Farmers and government extension officials are happy to use this hand net because of its higher insect caught efficiency. Disseminating this technology by Newspaper, Youtube, and facebook. Now trying commercialization by non-government organizations and Private organizations of Bangladesh. Philippines, South Korean and Indian farmers and IFOAM-organics international showed interest to disseminate this hand net among rice farmers.

THE TROPICAL AGRICULTURE PLATFORM

The Tropical Agriculture Platform (TAP) is a G-20 initiative launched in 2012 to promote agricultural innovation in the tropics. TAP has formed a coalition of more than 50 partners, led by the Food and Agriculture Organization of the United Nations (FAO) and generously supported by the European Union (EU). The main goal of TAP is to strengthen agricultural innovation systems (AIS) in developing countries through coordinated multi-stakeholder interventions.

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Global Call for Agrifood System Innovations and Stories of Capacity Development for Innovation

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