INTERNATIONAL JOURNAL OF BUSINESS, SOCIAL AND SCIENTIFIC RESEARCH
ISSN: 2309-7892 (Online), 2519-5530 (Print), Volume: 11, Issue: 1, Page: 19–20, January-June 2023

Short Communication

DOI: http://doi.org/10.55706/ijbssr11104

MANAGEMENT OF INSECT PEST IN RICE SEEDBED USING A NOVEL RECTANGULAR HAND NET (RHN) FOR INSECTICIDE FREE SEEDLINGS

*M M Moniruzzaman Kabir[1], Md. Alamgir Hossain[2], M Panna Ali[1], Md. Nazmul Bari[1], Sheikh Shamiul Haque[1], Shaikh Tanveer Hossain[3] and Juel Datta[1]

[**Citation**: Kabir, M.M.M, Hossain, M. A., Ali, M. P., Bari, M. N., Haque, S. S., Hossain, S. T. and Datta, J. (2023). Management of insect pest in rice seedbed using a novel rectangular hand net (RHN) for insecticide free seedlings. *Int. J. Bus. Soc. Sci. Res*. 11(1): 19–20. Retrieve from http://www.ijbssr.com/10.55706/ijbssr11104]

Received Date: 25/12/2022 *Acceptance Date: 06/02/2023* *Published Date: 07/02/2023*

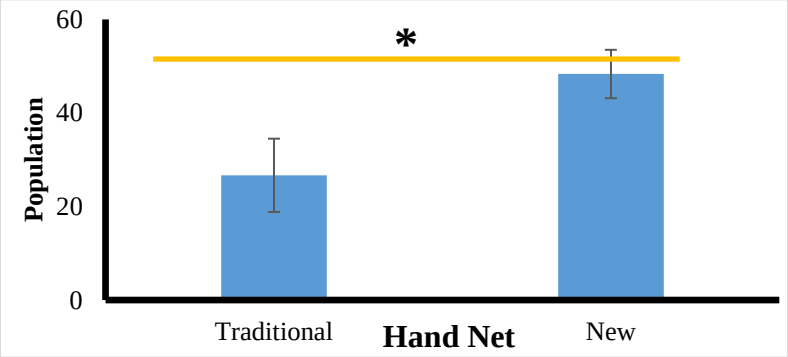
Rice is the main food for more than half of the world population but seriously yield losses due to insects and diseases (Ali et al., 2017). Bangladesh agriculture was totally organic before 1950, when pesticides were introduced in farmer's field. In 1950, Bangladesh population were 43.6 million which has been exceeded 165 million by 2022. After 1960s Green Revolution pesticides uses rapidly increased to meet up food demand and growing populations cereal food security, as a result emergence of new pests and increased incidence of some pest started to appear (Islam et al., 2009).

Due to the climate change and intensive cultivation, insect pest like yellow stem borer (YSB), thrips, brown planthopper (BPH), green leafhopper (GLH), rice hispa (RH), leaf folder (LF), grasshoppers (GH) etc., attacks increasing day by day in rice seedbed (BRRI, 2021). Farmers rely on solely insecticides to control insect pest in seedbed as well as main rice field. Bangladeshi rice farmer's generally used 3-4 times insecticides in single season without judging the insect pest's infestation level (Ali et al., 2017). Farmer's spend up to Tk. 1,000 BDT/- acre for spraying chemical to protect rice seedlings from pest in seedbeds, consequently yearly national estimated aggregated cost 50 crore in BDT (equals to more than 5 million USD) (Dhaka Tribune, 2022).

Bangladeshi farmers used 37,563 tons of chemicals in 2020 for crop production, where 12,428.71 tons to manage insect pest only (BCPA, 2021). Heavy uses of chemical insecticides reduce natural enemy and promoting pest outbreaks in rice ecosystem (Heong et al., 2015). Pesticides pass away into rivers, drinking water, and agricultural products thus damaging natural ecosystem, threatening food safety, and human health (Ali et al., 2020).

Insect pest 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 and its insect catching efficiency is also lower than rectangular hand net (Fig. 1). To alleviate this problem, developed a novel rectangular hand net and evaluated the efficacy for managing insect pest in rice seedbeds.

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, radious 0.75 inch, and market available white colour mosquito net, which length from the frame is 80 cm. Methods of application is rapidly walking with RHN (Fig. 2) around the seedbed (model seedbed one-meter width and length depends on land condition). After sweeping full seedbed harmful insect has been destroyed and beneficial insect released back in the same field.



*Significantly different at 5% level (Students t-test)

Fig. 1: Round and Rectangular hand net insect caught performance in rice seedbeds

*Corresponding Author Email: mkabir1985@gmail.com
1. Entomology Division, Bangladesh Rice Research Institute, Gazipur-1701
2. Plant Breeding Division, Bangladesh Rice Research Institute, Gazipur-1701
3. Director, Policy and Strategy, IFOAM-Organics Asia

To test the performance of this novel sweep net we conducted experiments in Boro, 2021-22 rice growing season at Charbadna farm of Bangladesh Rice Research Institute (BRRI) regional station, Barishal. Fifteen square meter ($15m^2$) seedbeds, RCBD with 3 replications followed at high yielding variety BRRI dhan29, BRRI dhan88, and BRRI dhan89. After each sweeping individual rice insect pest and natural enemy counted and recorded manually. RHN insect caught performance (48.33) significantly better than round hand net (26.67)

In Aus season (2022), 15 m^2 seedbed, BRRI dhan48, BRRI dhan85, and BRRI dhan98 with three treatments, T_1= seven days' interval sweeping, T_2= two times sweeping once in 12 days after sowing and another 25 days after sowing, T_3= control seedbed with three replications at BRRI, Charbadna farm at BRRI, Barishal. Green leafhopper (GLH) major pest causes of rice tungro disease in Bangladesh. Finally, the experiment showed control plot found higher no. of GLH but in treated plot GLH (T_1=67, T_2=20.33) was under controlled and lower than control plot.

Minute pest thrips is the most destructive pest in the rice seedbed (BRRI, 2022) due to this insect seedbed become yellowish. In T. Aman season, 2022 high yielding variety BRRI dhan52 and BRRI dhan76, 25 m^2 seedbed with three treatments and replications, T_1= seven days' interval sweeping, T_2= two times sweeping once in 12 days after sowing and another 25 days after sowing, T_3= control seedbed at BRRI, Sagordi farm. After every full seedbed sweeping counted manually insect pest and natural enemy, harmful insect pest destroyed and natural enemy released back in the same field. Control plots was affected by thrips and economic threshold level (ETL) crossed and leaves become yellowish and some needle shapes but treated plot reduced thrips (T_1=76 and T_2 =53.67), remain green and no symptom shown. T_1 treatment shows significantly higher thrips control than others treatment.

RHN caught maximum number of major populations YSB, rice hispa, BPH, rice leaf folder, GH, etc., and remained under control.

RHN caught beneficial insect (19.60 %) compare to harmful insect pest (80.39 %). In Aus season 2022, 20 m^2 area BRRI dhan48, BRRI dhan98, BRRI dhan85 seedbed tenure caught insect pest (87.78 %) and natural enemy (12.22 %). Same year T. 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 benefitted for conserve beneficial insect.

This technology reduced 100% use of insecticides in rice seedbeds. 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 green technology, it may be redundant insecticides spray in rice producing countries (Dhaka Tribune, 2022).

Fig. 2: Rectangular hand net (prototype) and its application mode in T. Aman rice seedbed in BRRI, Charbadna farm

References:

Ali, M. P., Bari, M.N., Ahmed, N., Kabir, M. M. M., Afrin, S., Zaman, M. A. U., Haque, S. S. and Willers, J. L. (2017). Rice Production without Insecticide in Smallholder Farmer's Field. Front. Environ. Sci., 5(16). doi: 10.3389/fenvs.2017.00016

Ali, M.P., Nessa, B., Khatun, T., Salam, M. U., and Kabir, M. S. (2020). Doubling rice productivity in Bangladesh. A way forward to combat insect pest in rice. Bangladesh Rice Research Institute, Gazipur, Bangladesh: pp. 263

Ali, M.P., Bari, M. N., Haque, S.S. and Kabir, M. M. M. (2019). Establishing next-generation pest control services in rice fields: eco-agriculture. Sci Rep 9, 10180 https://doi.org/10.1038/s41598-019-46688-6

Annual Report of Bangladesh Rice Research Institute, (2020-2021). BRRI, Gazipur 1701, Bangladesh, 326 pp.

BCPA (Bangladesh Crop Protection Association) report (2021).