Adoption and Success Story of ICAR-CIAE –NRCB Battery Operated Banana Pseudostem Injector in Kerala

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Background

Banana is a major fruit crop grown in Kerala. This is third most grown fruit crop with in terms of area under cultivation with jack fruit and mango occupying the first two positions. It is a fruit that is most consumed and is used in various festival seasons. Total area of Thiruvananthapuram district under banana cultivation is 3507 ha with a productivity rate of 9134 kg/ha. Farmers face a lot of problems while cultivating this crop. The banana stem weevil (*Odoiporus longicollis*) is cosmopolite's insect pest that threatens the banana plant. The most common management practices followed for managing this pest include application of insecticides. During 5th, 6th and 7th months stages, farmers spray the biocontrol agents in the leaf axles. This is a time-consuming process with more quantity being sprayed than what is recommended (Generally 75ml/leaf will be sprayed).

Interventions

Pseudostem weevil is considered as the major pest of banana which causes substantial yield loss in banana cultivation. As the name indicates the start of pseudostem weevil infestation commences from three and a half months after planting. 30-40 % yield loss due to infestation can be avoided, saving the crop, resulting in realization of good yield by the use this equipment at right time.

There are different methods practiced by farmers to address this problem. The spraying is one of most common practice followed by farmers for managing this pest. But there are losses due to evaporation; quantity of liquid applied is more/plant, causes threat to environment, labour intensive process and above all the insecticides are health hazards. Another method is by applying chemical inside the pseudostem through crude method like making hole or use syringe and applying the chemical which help in providing the plants protection against pest attack. Every plant has to be provided this treatment at 3-4 places at varying height. While using this injector that syringe need to be filled in intervals which is a time-consuming process.

Considering these facts, a field demonstration was conducted for the management of banana pseudostem borer using battery operated banana pseudostem injector developed by Regional Centre ICAR-Central Institute of Agricultural Engineering (CIAE), Coimbatore in collaboration with ICAR National Research Centre for Banana (NRCB), Trichirapalli. Injection of solution in to the pseudostem is carried out at the recommended dosage for the management of pseudostem weevil in banana. Injection of pseudostem is recommended to be carried out at two heights, viz. 45 and 150 cm from 5th to 8th months for control of pseudostem weevil.

Process

KVK as a part of Front-Line Demonstration for the year 2022-2023 conducted field trail at Balaramapuram Panchayat covering 1 ha area with 10 numbers of farmer participants. The programme was initiated by KVK with the support of VFPCK. Farmers' meeting was arranged and delivered the technology to banana farmers. The operation the machine was demonstrated at the field level. Apart from on and off campus trainings, extension functionaries' trainings were conducted towards the popularization of the technology.

Battery operated injector

The major parts of the battery-operated banana pseudostem injector are chemical tank with battery, injector, pump electronic controller and lance with needle for depth and quantity to be injected and non-return valve. It is a device for injecting liquids directly into the pseudostem of a banana plant at required depth and places. A needle is inserted into the soft tissue of a banana pseudostem, and recommended dosage of liquid is injected through said needle. The solution was prepared and filled in the tank made of plastic with a storing capacity of 8-16 ℓ. The battery-operated pump is used to discharge required quantity of liquid from tank to injection system. The electronic control unit is attached with electronic embedded system to release predetermined quantity of liquid. The non-return valve is attached with control unit to avoid reentry of chemical to the injector after completion of injection operation. Inject dose of 5ml to 10ml of the prepared solution to the Pseudostem 2 feet above ground level in a 45-degree slanting angle on opposite sides of the banana plant.

Output

Banana Nendran variety having 4th month stage was used for the study. The performance of the machine was showed in Table1.

Table 1: Technical Parameters of the study

SI.No.	Parameters	Result
1	Quantity of liquid injected	5-10ml
2	Field capacity	325 trees/hour
3	Spillage efficiency	2 %
4	Injector efficiency	96%
5	Yield	147 q/ha

Outcome

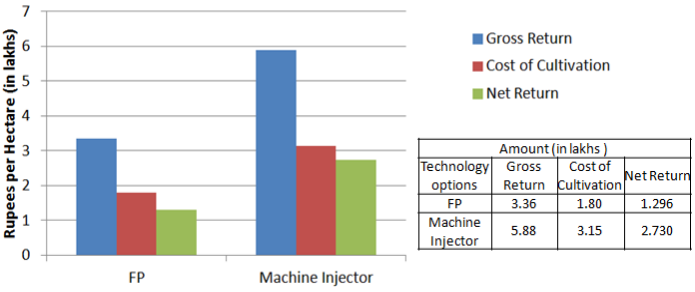
The method has the advantages that the pesticide application amount is saved, the purposes of reducing the pesticide amount and ensuring the prevention effect are achieved simultaneously, pollution to the environment is reduced, pesticide application labor intensity is reduced, labor cost is saved, operation is convenient, pesticide application is free from limitation of weather conditions, and toxicity of the applied pesticide is reduced.

Horizontal Spread

Malayalam daily newspaper Malayala Manorama and Kerala Kaumudhi covered the news about the utility of the machine. Popular article on Battery operated banana pseudostem injector was published in VFPCK monthly agricultural magazine Krishijyanganam January 2023 issue. Technology shared with agricultural department for further development.

Economic gains:

The banana farmers generally lost 45% of the plants by the attack of this pest itself. By the use of this machine this loss is completely eliminated. The technology of banana pseudostem injection @ 10ml / plant registered the highest per cent reduction (96%) over the farmers' practices with a net profit of Rs. 273000. As the banana pseudostem injection technology is very simple, cost effective and produced a BCR of 1.87 per rupee investment is highly accepted by the farmers (Fig.1). And they were actively participated in the demonstration programme to know the pseudostem injection technology for pseudostem weevil management



Amount (in lakhs)			
Technology options	Gross Return	Cost of Cultivation	Net Return
FP	3.36	1.80	1.296
Machine Injector	5.88	3.15	2.730

Fig. 1. Cost benefit analysis

Employment Generation

Agricultural labourers were trained to use the machine for the management. VFPCK members made to form a group of members to perform the task of pseudostem injection with the support of this newly invented machine. The injector can be used as one of

the equipment under custom hiring operation. Women self-help group/individual farmer can purchase the unit and it can be used for hiring purpose and out hiring business the owner can get good profit.

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