CHANGES IN INSECTICIDE USE UPON ADOPTION OF THE TRICHOGRAMMA METHOD[1]

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INTRODUCTION

In 1988 the biological control method using *Trichogramma evanescens* was introduced by the Philippine-German Biological Plant Protection Project (PGBPPP) to Philippine corn farmers. With this method it was hoped to curtail the use of insecticides for the control of the Asian corn borer. The Trichogramma method, informal observation shows, has been met with favor and general acceptance by farmers. Field reports claim that Trichogramma users swear to the method's effectivity and declare that they are convinced of its manifold advantages compared to that of the chemical method of corn borer control. To verify these claims, it was sought to document changes in the corn borer control practice of Trichogramma users as a result of the adoption of the method. Has the Trichogramma user indeed reduced his consumption of insecticides?

Through a survey it was sought to provide an answer to the above query and to determine the impact of the Trichogramma method upon farmers' corn borer control practices. This paper presents data derived from the survey. Specifically, the discussion focuses on data pertaining to a) changes in crop protection practices after the introduction of Trichogramma; b) changes in insecticide use after the introduction of Trichogramma; and c) other consequences of the adoption of the Trichogramma biocontrol method by corn farmers.

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1. This study has been carried out in the framework of the Philippine-German Biological Plant Protection Project (PGBPPP), a cooperation between Bureau of Plant Industry and Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH, funded by the German Government

METHOD

The survey was conducted during the period July to September 1992 in the province of Isabela in Region 2. The Region is one of the major corn growing areas in the country and the Regional Crop Protection Center (RCPC), based in Ilagan, Isabela has been in the forefront of Trichogramma research and production since 1983.

Respondents were drawn from RCPC recipients of Trichocards during the wet season 1991 (March to August) and the dry season 1991- 92 (November to March). A total of 200 respondents from 14 municipalities of Isabela comprised the sample.

A one-shot survey using an interview schedule as instrument for data gathering was designed. The following variables served as indicators of changes in insecticide use: number of insecticide users, frequency and volume of insecticide dosages.

Data were analyzed using descriptive statistics. All levels of significance for the chi square test for independence were set at alpha=0.05.

RESULTS AND DISCUSSION

1. Respondents

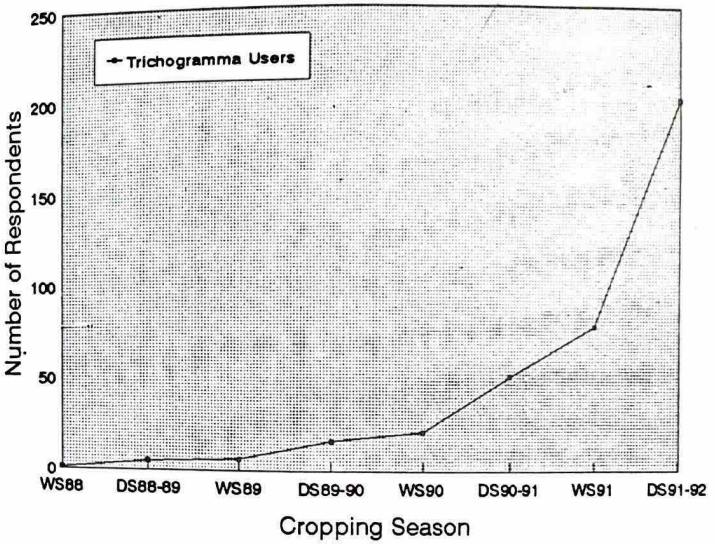
The largest group of respondents, 41%, comes from Ilagan. Most of them are male (61%). Ages range from 18 to 72 years; the greatest percentage (37%) falls in the age range of 30-39 years. A majority has an elementary education (51%) and has attended at least one training or seminar on farm technology.

A majority of the respondents (55%) owns the farms they till. Of those who do not, the largest percentage (46%) are tenants. Farm sizes range from 0.5 to 10 ha; average is 1.8 ha.

Most of the respondents earn a living from farming alone, and solely from their corn crop.

The earliest Trichogramma user among the respondents reported applying the method for the first time in the dry season cropping of 1983-84, at a time when the technology was still undergoing trials in the country. To be sure, this case was an exception. The technology begun to be officially propagated only in 1988. The number of Trichogramma users among the respondents started to increase beginning with the dry season cropping of 1990-91 (Fig. 1). It was, however, during the dry season cropping of 1991-92 when 61% of the respondents were introduced to Trichogramma. This sharp rise in the number of users coincides with the high Trichogramma production of the RCPC in Ilagan during the same season. Thus, at the time of the actual survey in August to September 1992, most of the respondents have had only one cropping season of experience with the Trichogramma method.

Figure 1. Number of Trichogramma users per cropping season



2. Changes in crop protection practices

Of the 200 respondents, 147 (74%) were insecticide users prior to their first use of the Trichogramma method (Table 1). Another 47 respondents applied cultural practices such as detasseling and crop rotation while the rest did not employ any pest control method at all. Of the insecticide users, 88% (or 129) applied insecticide as sole pest control method while the rest combined it with another method, e.g., detasseling.

Table 1. Pre-Trichogramma corn borer control practice.

Variable	Respondents No.	%
1. Method		
Insecticide	147	73.5
Cultural practice*	47	23.5
None	3	1.5
Not applicable**	3	1.5
	200	100
2. Mode of use of insecticide		
Alone	129	88
In combination	18	12
	147	100
3. Method combined with insecticide (N: 18)		
Detasseling	5	18
Crop rotation	1	4
Sanitation	11	41
Thorough land preparation	10	37
	27***	100

* Includes detasseling, crop rotation, intercropping, etc.
** Refers to farmers who planted hybrid corn for the first time.
*** Total exceeds number of valid respondents due to multiple response.

Survey findings show that most of these pre-Trichogramma insecticide users stopped using insecticides when they started to use Trichogramma (Table 2). Forty-nine respondents, or 24%, applied Trichogramma along with another method, predominantly insecticides (82%). However, the persistent insecticide users applied insecticides with lesser frequency and dosage than before they begun to use Trichogramma.

Further data analysis shows that preference for insecticides to supplement the Trichogramma method was not related to farm size.

Table 2. Post-Trichogramma corn borer control practice.

Variable	Respondents No.	%
1. Method		
Trichogramma	200	100
2. Mode of use of Trichogramma		
Alone	151	75.5
In combination with other methods	49	24.5
	200	100
3. Method combined with Trichogramma (N: 49)		
Insecticide	40	82
Cultural practices	9	18
	49	100

3. Changes in insecticide use

The survey shows that the introduction of the Trichogramma method had marked consequences in the respondents' corn borer control practice.

Firstly, the number of insecticide users dropped to 40 persons from the previous 147 persons (Table 2). These 40 persistent insecticide users were those who combined the use of the Trichogramma method with that of insecticides to control corn borer.

Secondly, consonant with the decrease in the number of users occurred a `de-intensification' of chemical application as reflected in the frequency of insecticide applications and volume of dosages. A decrease may be noted (Table 3) in the percentage of users who applied

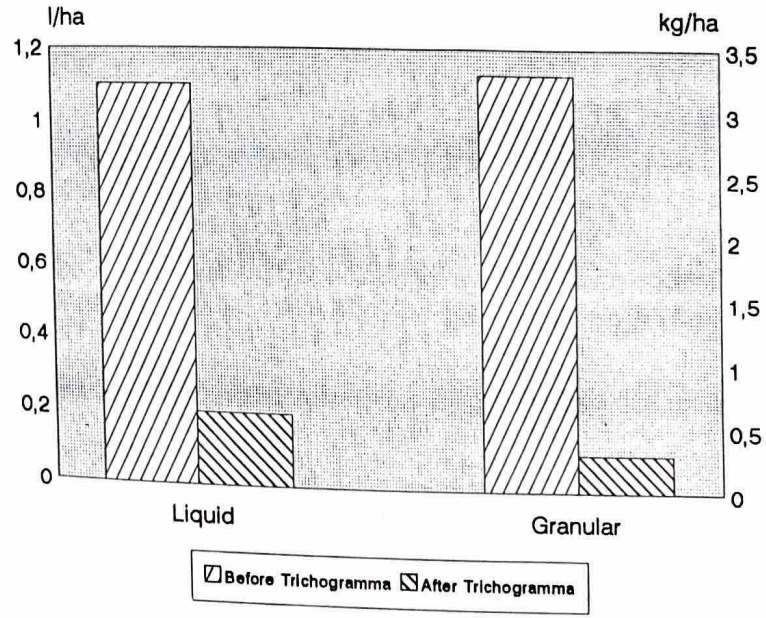
Table 3. Frequency and volume of insecticide use before and after the introduction of Trichogramma.

Variable	Before No.	Before %	After No.	After %
1. Frequency of application				
1	64	43	29	72.5
2	69	47	11	27.5
3	13	9	0	0
4	1	1	0	0
Total	147	100	40	100
2. Volume applied per hectare				
0.1 - 0.5 l/ha	19	13	14	35
0.6 - 1.0 l/ha	100	68	23	57.5
2 l/ha and above	6	4	0	0
more than 2 l/ha	22	15	3	7.5
	147	100	40	100

insecticides twice per cropping (from 47% to 27.5%) and those who applied larger dosages, i.e., 0.6 - 1 liter / ha or more (from 68% to 57.5%).

Indeed the decreased application frequency was matched by diminished insecticide dosages. Consumption of liquid insecticides declined by 82% from 1.1 to 0.2 l/ha while that of granular insecticides dropped by 91% from 3.3 to 0.3 kg/ha. Consequently, there was a drastic decrease in the respondents' total consumption of insecticides upon the introduction of Trichogramma (Fig. 2). In cumulative terms, the 125 respondents who used liquid insecticides before the introduction of Trichogramma applied a total of 381 l the last time they used insecticides. Upon the introduction of Trichogramma, consumption of liquid insecticides dropped to a total of 76 l for 38 users. Meanwhile, the consumption of granular insecticides went down from 1 155 kg for 22 users before the introduction of Trichogramma to 92 kg for 2 users upon the use of the method.

Figure 2. Average consumption of insecticides before and after introduction of Trichogramma



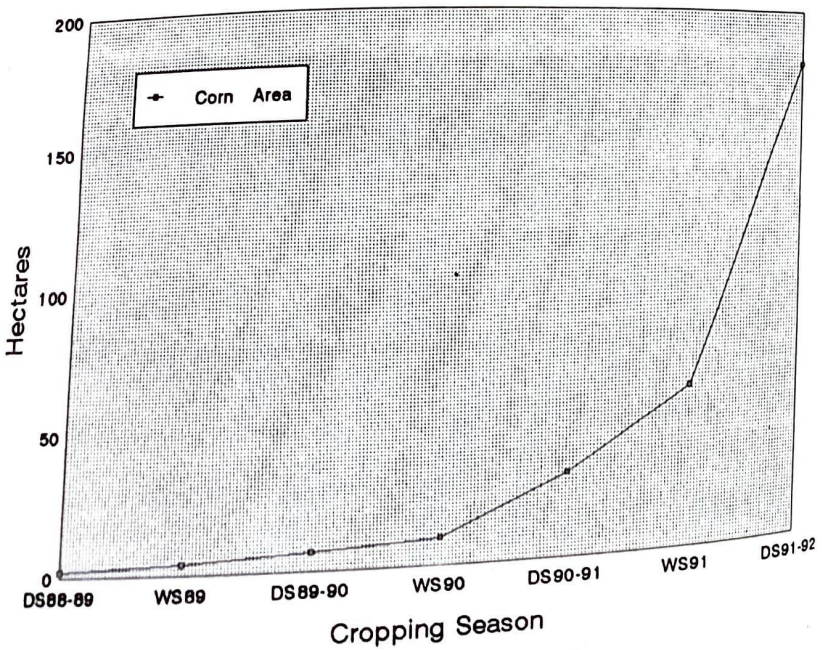
4. Consequences of Trichogramma use

Decreased insecticide use certainly has its consequences on the ecology and the health and income of farmers.

4.1 Ecological significance

The ecological consequences of Trichogramma use is reflected in the farm area which was eventually set free from chemical assault. The 200 respondents farmed a total of 365 ha, of which 97%, or 353 ha, were devoted to corn. The 147 pre-Trichogramma insecticide users farmed a total of 274 ha to corn. With the adoption of Trichogramma and the consequent decrease in the number of insecticide users to 40, the total hectarage treated with insecticides correspondingly dwindled to 87.3 ha. Thus, farmland exposed to insecticides decreased from 78% to 25% upon the onset of Trichogramma use.

Figure 3. Hectarage freed from insecticides



The area devoted to liquid insecticides dropped by 63% from 232 to 85.3 ha. Correspondingly, the area applied with granular insecticides decreased by 85% from 39 to 6 ha.

Figure 3 shows the cumulative increase in the area freed from insecticides through the cropping seasons.

4.2 Consequence to production costs

The use of insecticides is an expensive affair. Apart from the cost of the chemical, the expenses associated with the use of insecticides include that for the cost of the sprayer and wages for laborers who may be hired to do the spraying.

Data reveal a sharp decrease in the total expenses (that of all respondent-pesticide users) due to insecticides from P142 648 to P24 710 upon the adoption of Trichogramma. On a per hectare basis, this represents a decrease of 83% from P405 to P70 / ha.

CONCLUSIONS

Data obtained from the survey reveal firstly, that the introduction of the Trichogramma method has influenced the respondents to abandon or lessen the use of insecticides to control corn borer. Pesticide use was discontinued by 76% of the respondents.

Secondly, data show that the use of the Trichogramma method has significantly influenced insecticide use among the 200 respondents in the survey. The changes in insecticide use were indicated by marked decreases in the number of insecticide users and the volume of insecticides applied.

Thirdly, findings reveal that the use of the Trichogramma method had beneficial consequences to farmers and environment.

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