PRIME
Pest Risk Identification and Management

A collaborative project among the Department of Agriculture-Bureau of Plant Industry (DA-BPI), the Philippine Rice Research Institute (PhilRice), the International Rice Research Institute (IRRI), and the DA-Regional Field Offices (DA); with funding from the DA through the DA-Bureau of Agricultural Research.

PRIME aims to improve rice productivity, welfare, and competitiveness of Filipino farmers by mitigating risks of major pest outbreaks. We do this by identifying and understanding pest risk factors and providing targeted management recommendations.

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Pest Risk Identification and Management

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PRIME
Pest Risk Identification and Management

# Philippine Pest Surveillance and Early Warning Protocol for Rice (2nd Ed.)

**Bureau of Plant Industry**

# Philippine Pest Surveillance and Early Warning Protocol for Rice

Manila, 2020 ed.

The **Bureau of Plant Industry** through the **Crop Pest Management Division** is involved in the development of protocols for pest surveillance and rodent pest field experiments as well as its implementation. In addition, we are co-working with other partner agencies in the development of data validation, analysis, and reporting system. BPI also leads the development of a sustainability plan to ensure the smooth transition of PRIME from development to operation.

**Pest Risk Identification and Management** (PRIME) is a collaborative among the Department of Agriculture-Bureau of Plant Industry (DA-BPI), the Philippine Rice Research Institute (PhilRice), the International Rice Research Institute, and the DA– Regional Field Offices (DA): with funding from the DA National Rice Program through the Bureau of Agricultural Research.



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## INTRODUCTION

Farmers lose about 37% of their crop annually due to pests. Constant monitoring of pest population, incidence and crop damage is necessary to be able to provide timely advisory so that farmers can adopt needed crop protection measures to minimize yield loss.

Pest surveillance is a core function of the Bureau of Plant Industry (BPI), the national plant protection agency in the Philippines mandated to lead the monito ring, detection and avoiding the spread of serious indigenous pests and the early detection of invasive species. Timely information about emerging crop pests and needed crop management will minimize damage to crops and negative effect on farmers' livelihood.

Through the years, BPI has produced surveillance manuals, notable of these is the "Implementing Guidelines for the Surveillance and Early Warning System in Masagana 99" for rice (rev. ed. 1985). Since then, significant changes have occurred in the rice pest landscape that calls for the application of improved, efficient, and standardized surveillance protocols that can be easily followed by field technicians and understood by rice farmers. Furthermore, a crucial part of this updated surveillance protocol is the collection of data using Android-based smartphones and transmission of data to a central database which allows efficient data storage, validation, and automated report generation.

This Philippine Pest Surveillance and Early Warning Protocol for Rice was initially developed under the Philippine Rice Information System (PRISM) Project (2012-18) and further improved under the Pest Risk Identification and Management (PRIME) Project (2018 to present), both funded by the Department of Agriculture (DA) through the DA-National Rice Program and the DA-Bureau of Agricultural Research. PRIME is a collaboration involving the DA–Bureau of Plant Industry (DA BPI), the Philippine Rice Research Institute (PhilRice), the International Rice Research Institute (IRRI), and the DA-Regional Field Offices (DA-RFOs) throughout the country.

Since 2018, PRIME has been training staff from DA-RFOs who in turn conduct regional trainings on the use of the protocol described in this document. This initiative supports the development of a national pest database to guide policy and decision making on crop protection and provision of timely pest advisory to farmers. Farmers are expected to benefit through better pest advisories and targeted programs that promote best crop health management practices. With more efficient pest management strategies, farmers will have higher yields and higher income from rice farming, which is in line with the DA's twin objective of "Masaganang Ani at Mataas na Kita".



## 1. Site Selection

Monitoring fields are identified in the top rice-producing province in each region and top 3 rice-producing municipalities per province. The minimum total size of all sampling fields in each municipality should be one (1) monitoring site in every 200-hectares. The monitoring field will have the following characteristics:

1.2 Field Criteria

- The minimum size of the monitoring field is 200-sqm.
- The distance between monitoring fields should not be less than 1km-radius.
- It should be in the middle of a large rice area and should be representative of the whole rice area.
- It should be accessible and along the roads.
- Always choose the second plot from the road.
- The monitoring fields should be away from vacant lots, streetlights, houses, and trees to avoid effects of these habitats on pest population.
- It should be in the middle elevation.
- The variety planted in the sampling field should be the common variety in the area.
- Monitoring fields are fixed but If it became unfit with set criteria, this can be changed following the criteria mentioned above.

### 1.3 Assigning field codes

For each sampling field, a unique field code will be assigned. The first two digit refers to the region code followed by a dash ("-") then the four-digit field code.

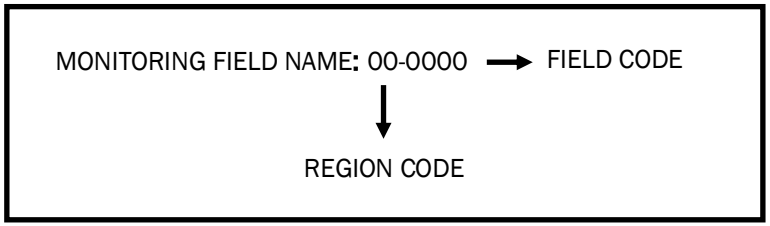



Fig. 1. Naming convention for field codes.

## PRIME Field Visit Schedule

Farmer interviews and field monitoring are done throughout the year following the schedule in Table 1 and Figure 2. The pest monitoring is conducted during the first 2 weeks of each month. This should be done early morning or late afternoon (for insect pests).

Table 1. Information, sources, and frequency of data collection for PRIME surveillance.

| Component | Data source | Frequency and timing of data collection |
|---|---|---|
| Production Situation | Farmer interview | At least twice per season at the end of the season |
| Pests and injuries | Field observation | Monthly; First 2 weeks of every month |
| Yield | Farmer interview | Once per season; After harvest |

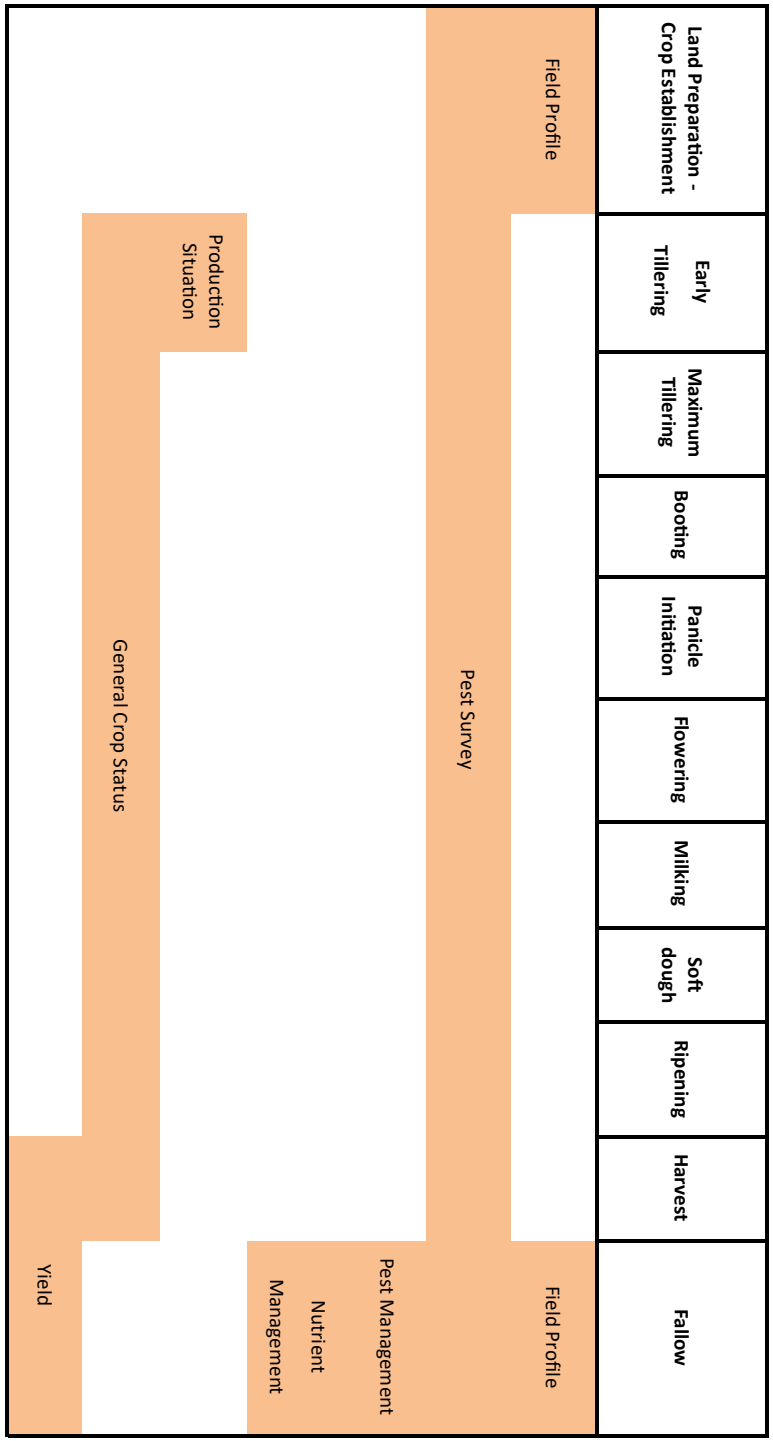



Figure. 2. PRIME Seasonal field visit schedule.

## 2. Rice Production Situation

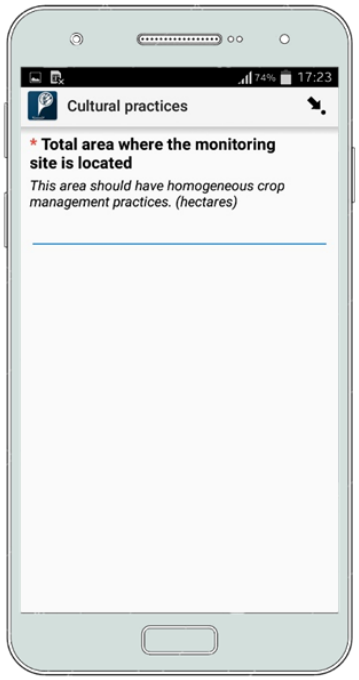
This refers to set of physical, biological, and socioeconomic factors that determine agricultural production (Savary and Castilla, 2009). The information gathered from here are used to analyze factors affecting yield.

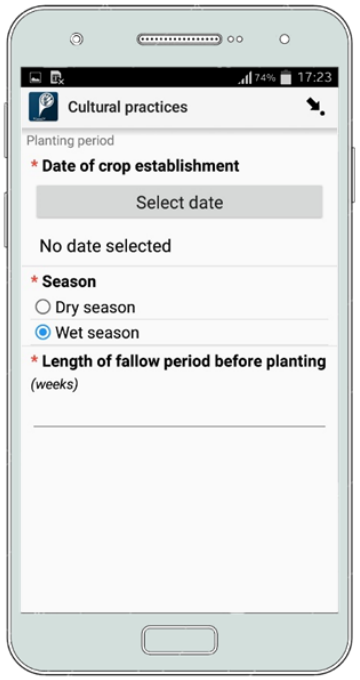
Table 2. Production situation variables collected at PRIME survey with its unit of measurement.

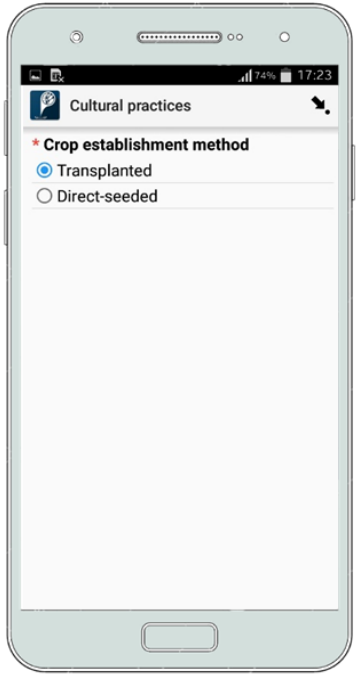
| | Variables | Unit of measurement |
|---|---|---|
| Cultural Practices | Total area where the monitoring site is located | Hectare (ha) |
| | Crop establishment | Date |
| | Season | Dry/wet |
| | Fallow period | Weeks |
| Field Profile | Method of Crop establishment | Transplanted/direct-seeded |
| | Transplanting age | Days |
| | Planting distance | L (cm) x W (cm) |
| | Seedlings per hill | Number |
| Nutrient Management | Fertilizer used | Date of application/ amount used |
| Pest Management | Pesticide used | Date of application/ amount used |

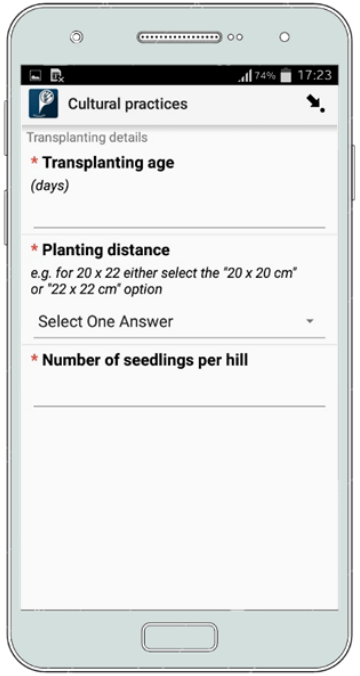


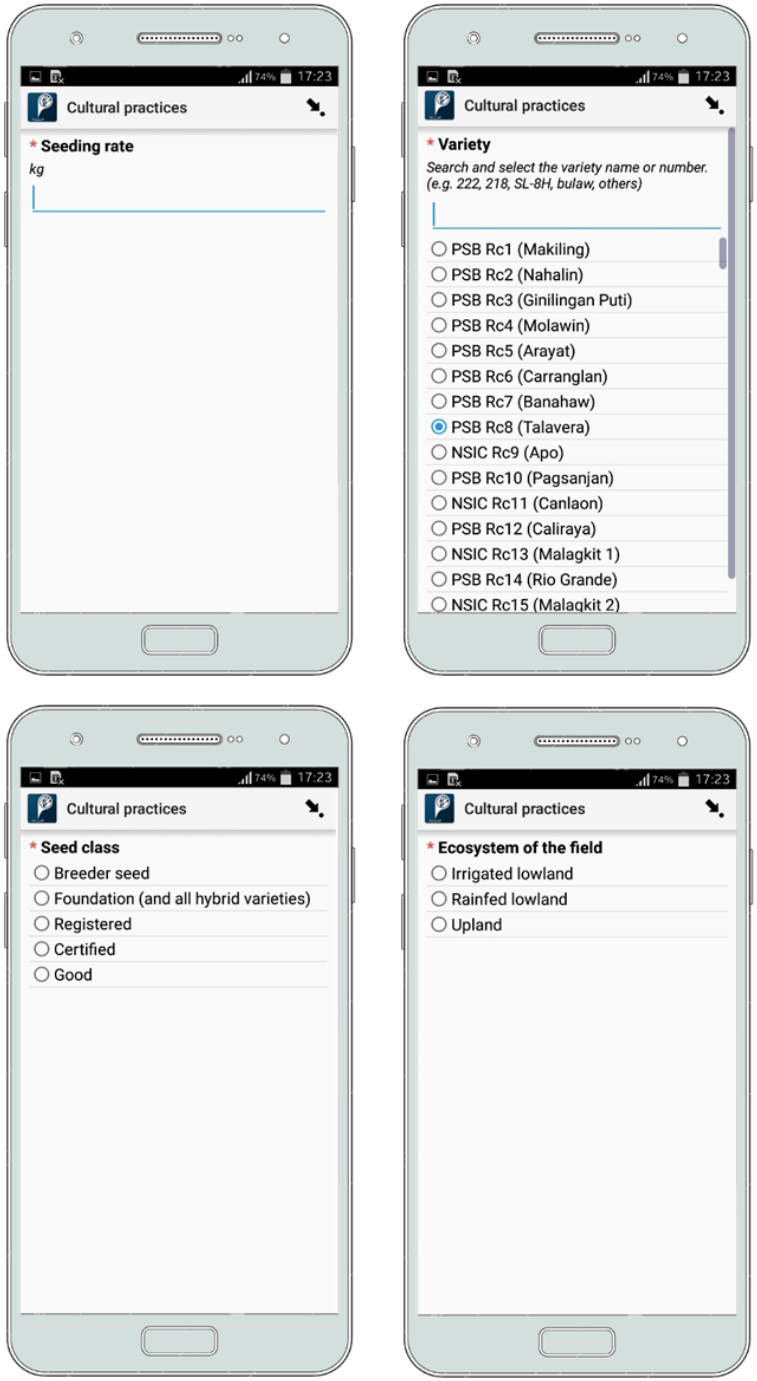
2.1 How to fill Cultural Practices ODK form.





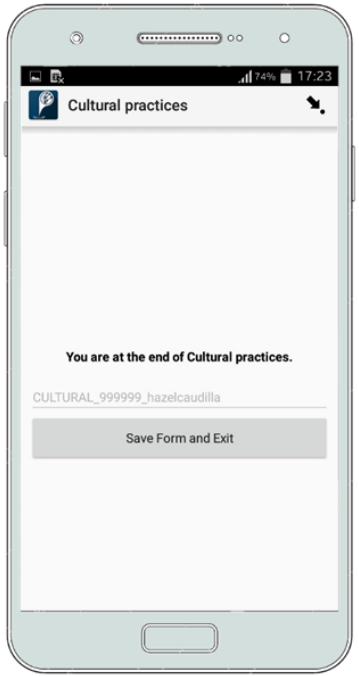
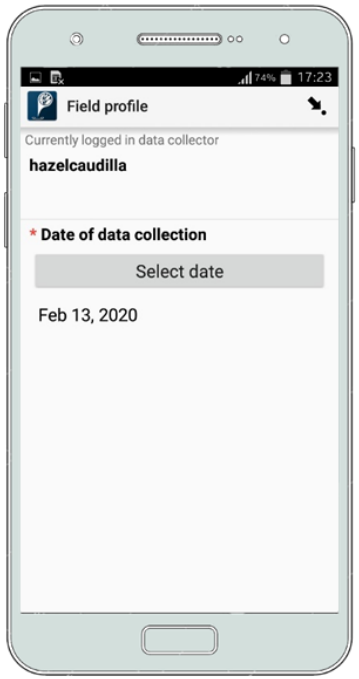



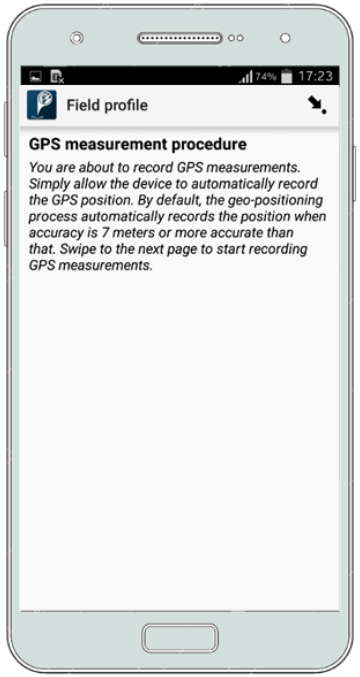

Figure 3. Illustrated procedure for collecting cultural practices of farmers using PRIME Collect App.

2.2 How to fill Field Profile ODK form.









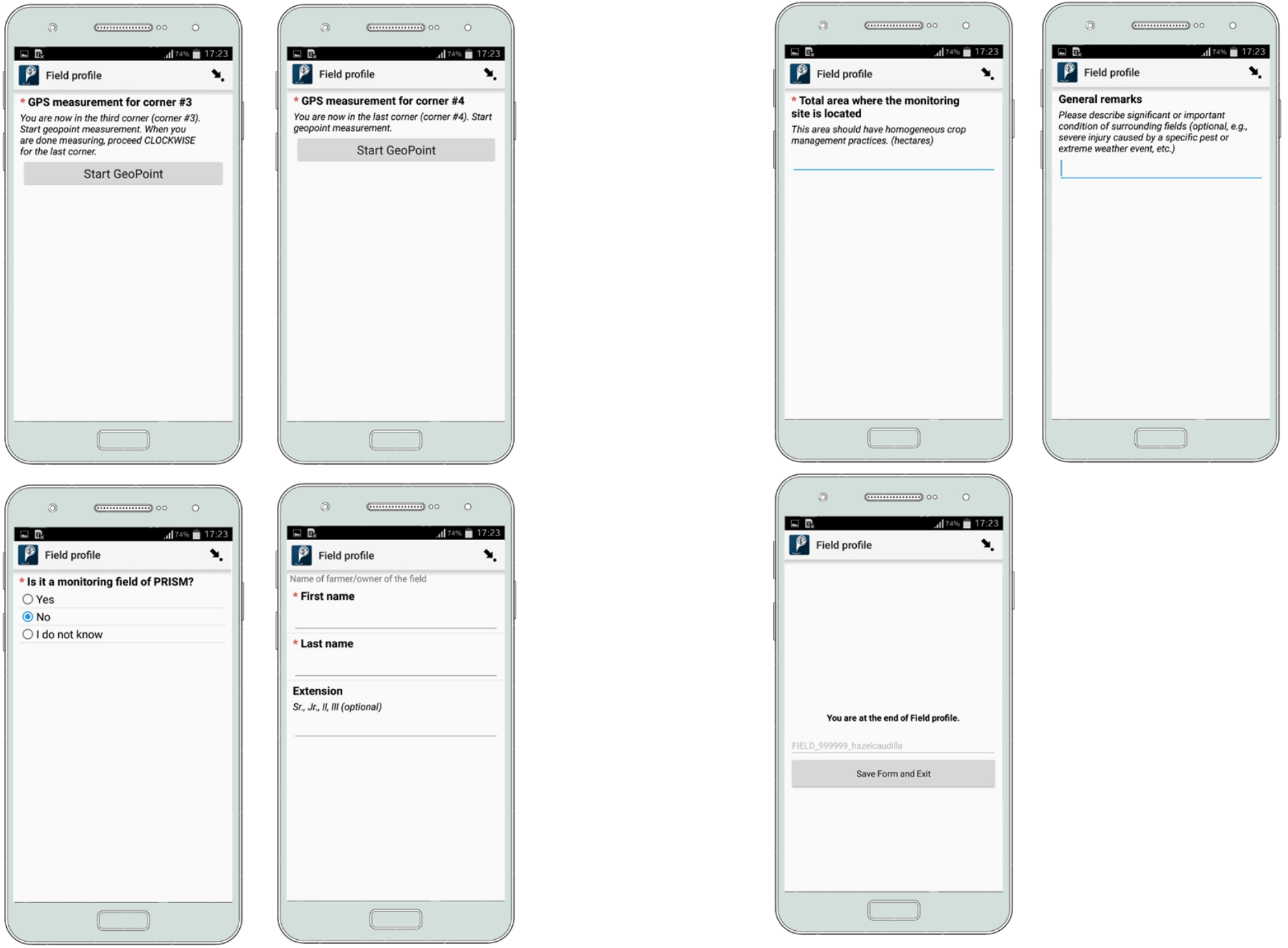



Figure 4. Illustrated procedure for collecting field profile using PRIME Collect App.

## 2.3 How to fill Nutrient Management ODK form.





Figure 5. Illustrated procedure for collecting nutrient management using PRIME Collect App.

2.4 How to fill Pest Management ODK form.

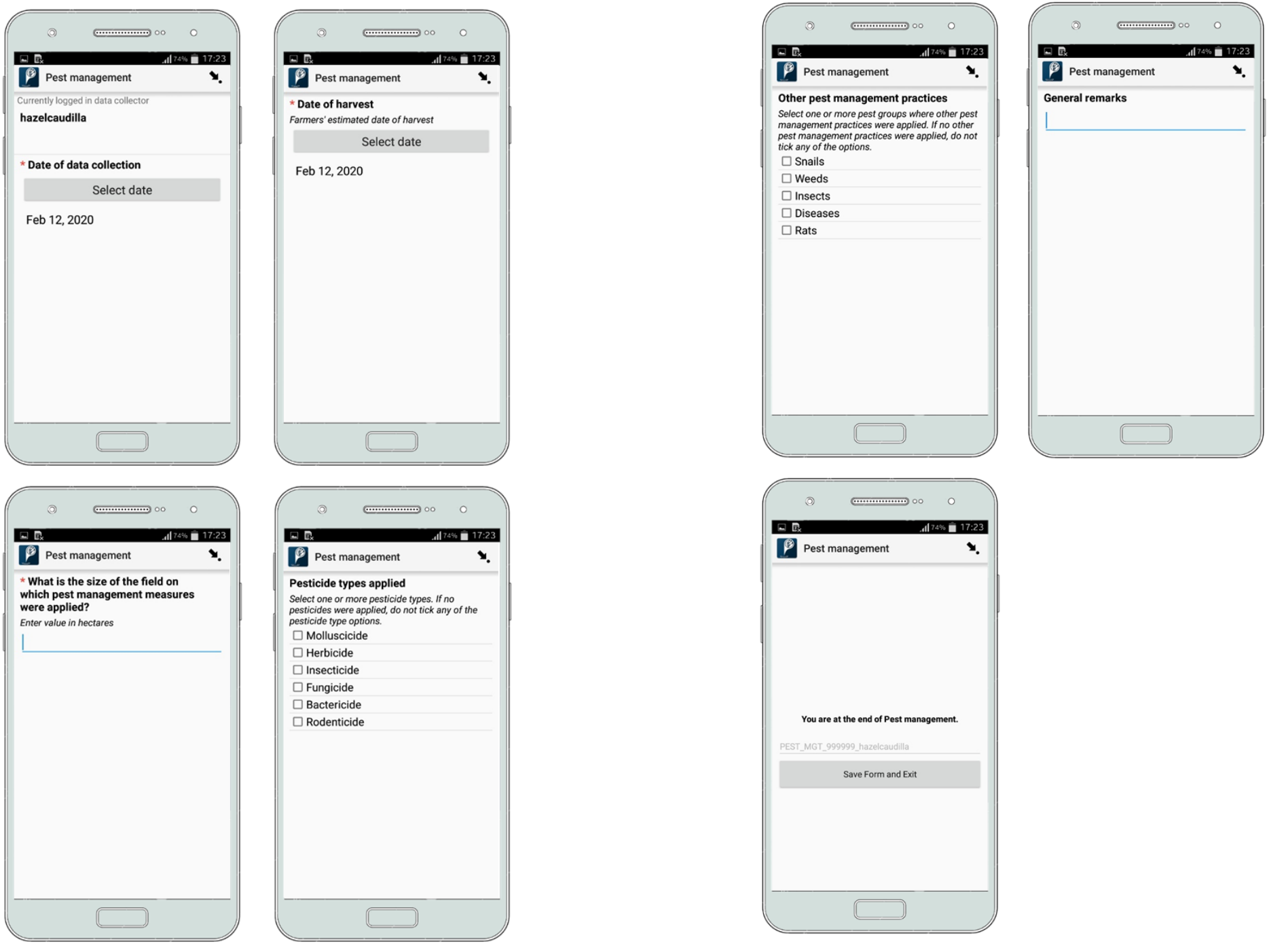



Figure 6. Illustrated procedure for collecting pest management using PRIME Collect App.

## 3. Monthly Assessment of Pest Injuries

### 3.1 Identification of sampling points

- For each monitoring field, 10 sampling points will be randomly selected every monitoring using the following criteria:
- Each sampling point is 1x1 meter for direct seeded or 25 hills for transplanted.
- Sampling points should be at least 2 meters away from the border of the field.
- The 10 sampling points will be randomly chosen by traversing the sampling field diagonally (see Figure 7).

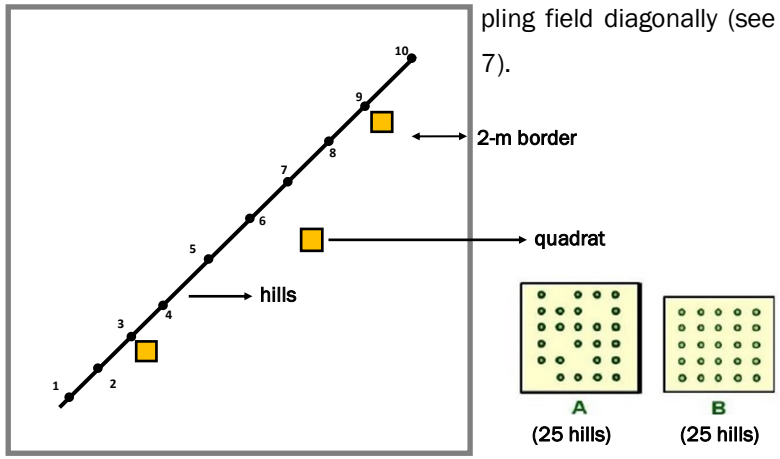



Figure 7. Sampling points in a sampling field.

### 3.2 Monitoring of Insect Population

Insect population will be counted in the 3rd, 6th, and 9th hill along the diagonal of the monitoring/sampling field (Figure 8).

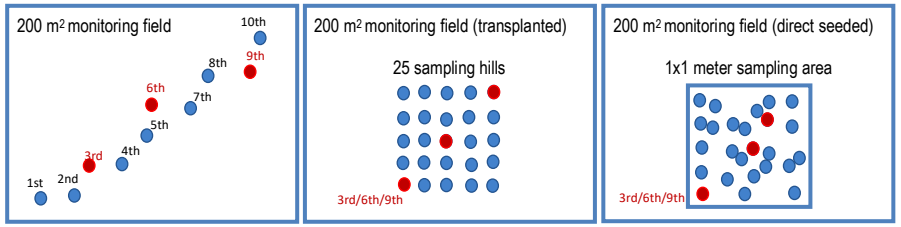



Figure 8. Insect population will be counted in the 3rd, 6th, and 9th hill.

For rice bug, count the number of rice bugs per sampling area. While approaching hill 3, count the number of rice bugs in 25 hills for transplanted rice or 1x1 m sampling quadrat for direct seeded rice (Figure 9).

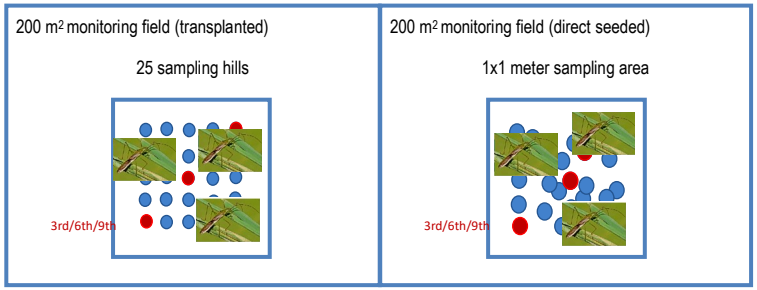



Figure 9. Monitoring of rice bug at 25 hills quadrats from 3rd, 6th, and 9th hill.

For green leafhopper (GLH), brown planthopper (BPH), and rice black bug (RBB), count the population in 3 hills at 1st and 3rd quadrat and 4 hills in 2nd quadrat (Figure 10).

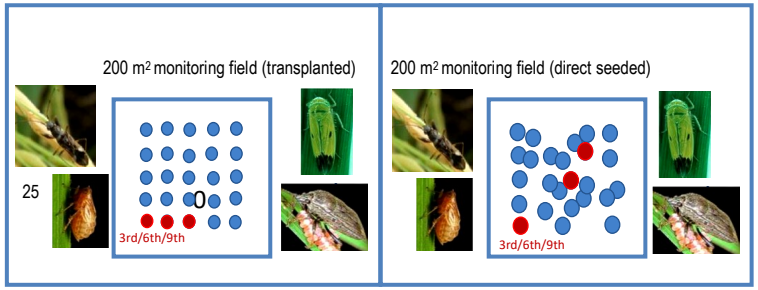



Figure 10. Monitoring of green leaf hopper, brown planthopper, and rice black bug from 3 hills of 1st and 3rd quadrats, and 4 hills of 2nd quadrat.

For stemborer egg mass count the number of stemborer egg mass per sampling quadrat (Figure 11).

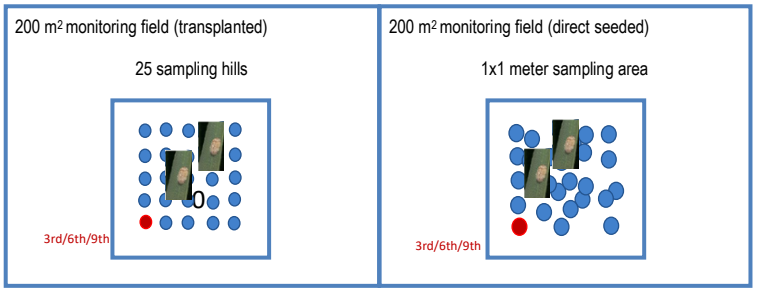



Figure 11. Monitoring of stem borer egg masses from 1st, 2nd, and 3rd quadrats.

### 3.3 Pest Injury

For hopperburn, bug burn and tungro, count the hills with tungro per 1x1 quadrat per monitoring field (Figure 7).

For deadheart and whitehead caused by stem borer, assess 10 hills diagonally per monitoring field (Figure 8).

### 3.4 Weeds

Assess weed cover (percentage) using the PRISM Scale (Figure 12). Identify top three weed species within the 3-sampling area only. This should be done at the 3rd, 6th, and 9th hill.

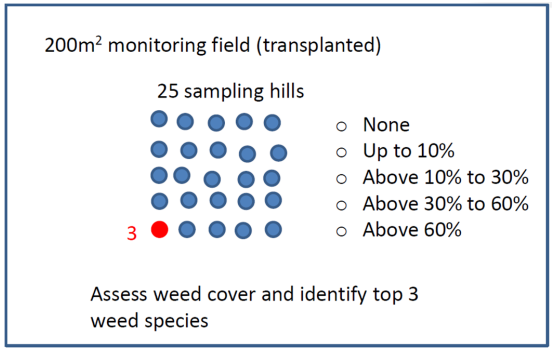



Figure 12. PRISM Weed assessment scale.



### 3.5 Rat Pest

- Conduct monthly visit at the same time to assess other pests/pest damage.
- Determine rat damage using the following rating scale:

0% - None
>0% to 2% - Low
>2% to 5% - Medium
>5% - High

If the damage is medium to high, estimate the incidence by using the PRISM procedure (Figure 13).

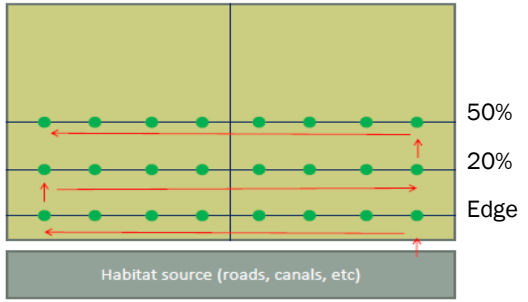



Figure 13. PRISM procedure or monitoring rat damage.

- At each monitoring field, mark each stratum at the edge of the field, 25% in, and 50% in of the paddy (Figure 13). These represent three different strata of the field. The longer side of the field should be facing the source habitat such as main roads, dikes, and canals.
- Count 8 sampling points at the edge, 25% in, and 50% in of the field. At each sampling point, there should be a minimum of 20 tillers assessed. Determine the cut and uncut tillers caused by rodent pests including the total number of tillers.

1 sampling point = 20 or more tillers

- Total number of tillers
- Damaged tillers

$$\% \text{ damage} = \frac{\text{damaged tillers}}{\text{total number of tillers}} \times 100$$

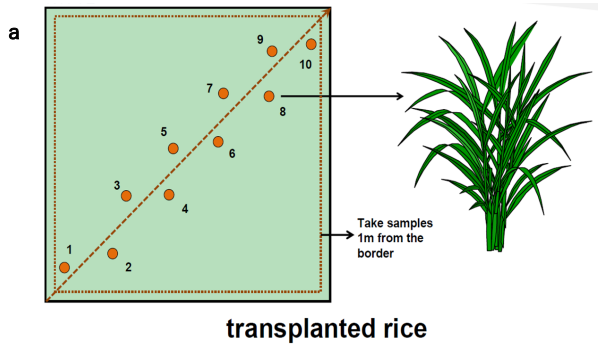
* If damage reaches 5% based on rating scale of the 20% field visited, report immediately to RCPC.

3.6 Incidence and Severity of Diseases

- Use 10cm x 10cm quadrat for direct seeded rice (Figure 14).
- Focus on major plant diseases and injuries (leaf blast, brown spot, sheath blight, bacterial blight).
- For severity assessment per sampling area:

  Rating: 1%, 5%, 10%, 25%, 50%, 75%, >75%

- Assessment of neck blast is the same as that of whitehead caused by stem borer.
- Other diseases that will be observed will be noted.



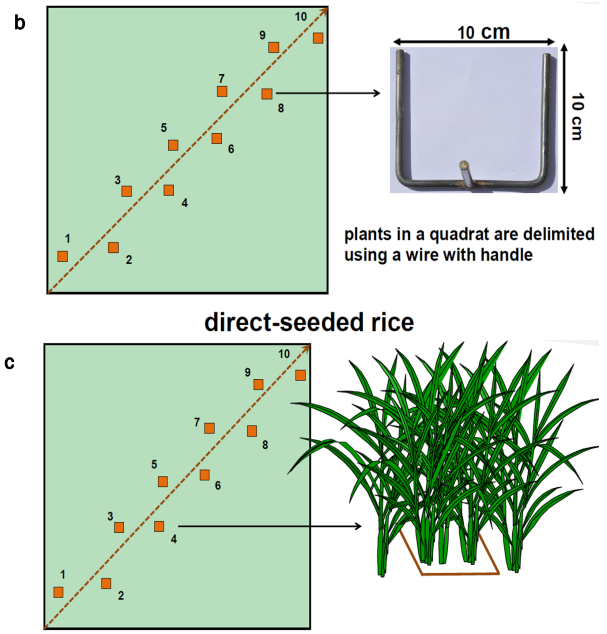




Figure 14. Monitoring of disease at transplanted (a) and direct seeded rice (b&c).

3.7 Assessment of Systemic Disease

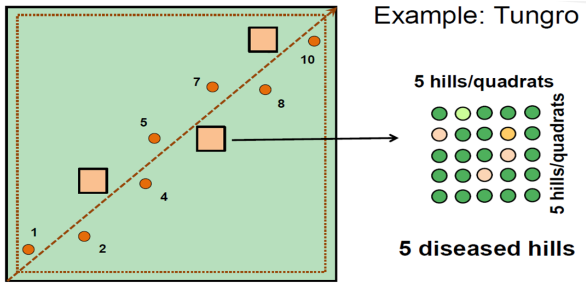



Figure 15. Assessment of systemic diseases from quadrat 1, 2, and 3.

Assess the incidence of the following:

1.Bacterial blight (BLB)

2.Leaf blast (LB)

3.Neck blast (NB)

Table 3. Sequence of data collection.

| Hill or Quadrat No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| No. of tillers | | | | | | | | | | |
| No. of panicles | | | | | | | | | | |
| No. of leaves/tiller | | | | | | | | | | |
| No. of leaves w/ BLB | | | | | | | | | | |
| No. of leaves w/ LB | | | | | | | | | | |
| No. of panicles w/BLB | | | | | | | | | | |

Injury Incidence Calculations

**Leaf injury incidence (%)** = $\frac{\text{Injured leaves}}{\text{(No. of tillers/hill x Mode of leaves)}}$

**Panicle injury incidence (%)** = $\frac{\text{Injured panicle}}{\text{Number of panicle}}$

**Tiller injury incidence (%)** = $\frac{\text{Injured tiller}}{\text{Number of tillers}}$

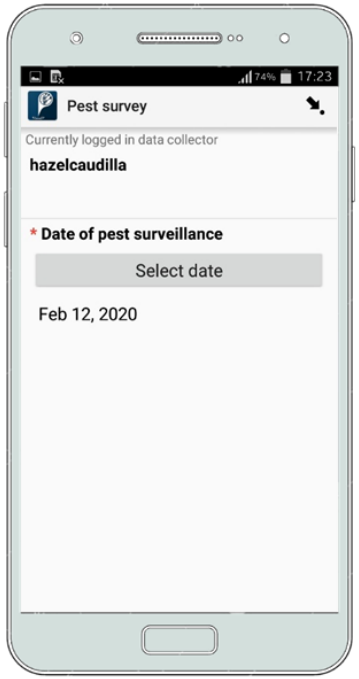
Incidence:

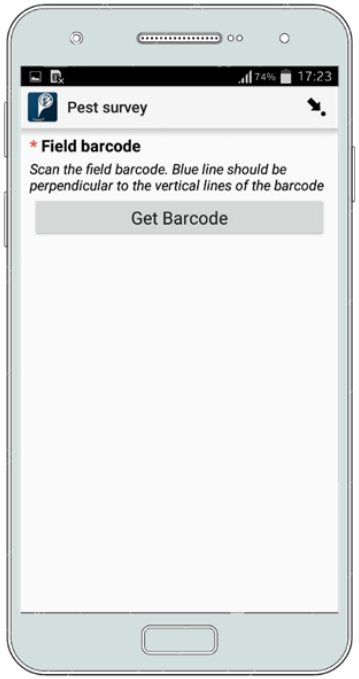
Number of sampling units that are injured.

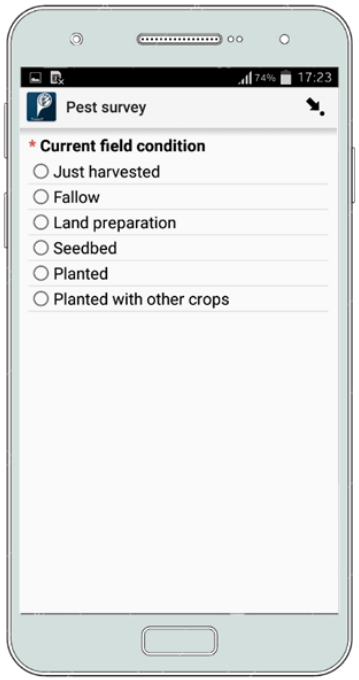
Expressed as a percentage or proportion of the total number of sampling units assessed.

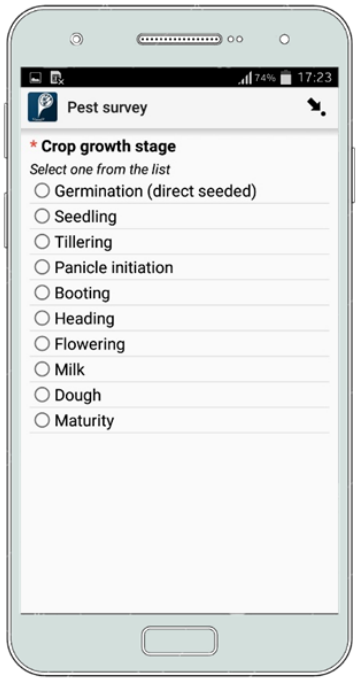


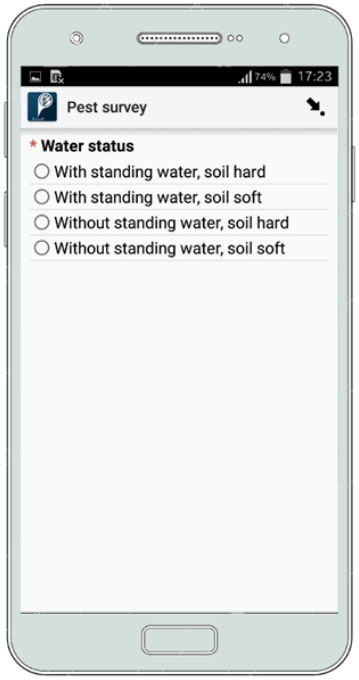
3.8 How to fill the pest survey form.

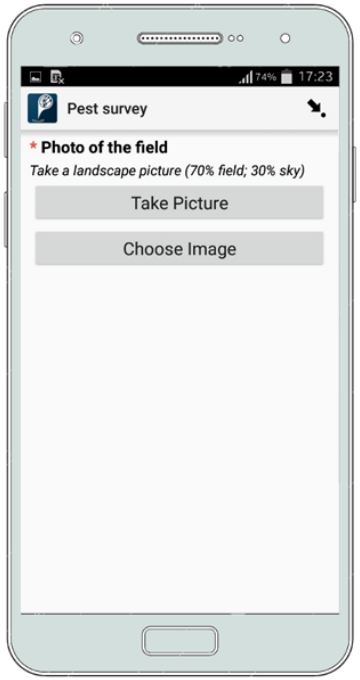


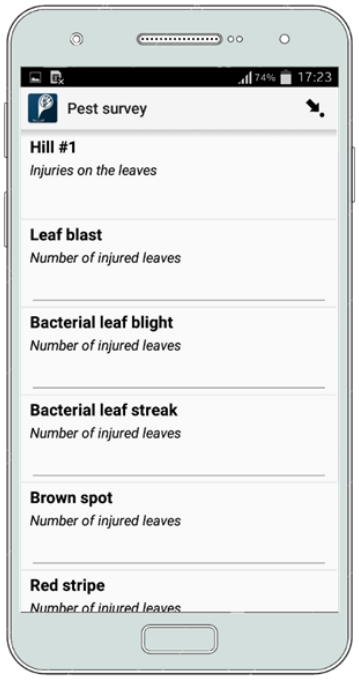



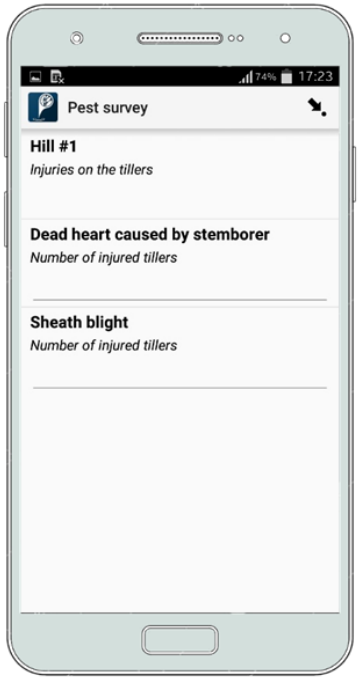



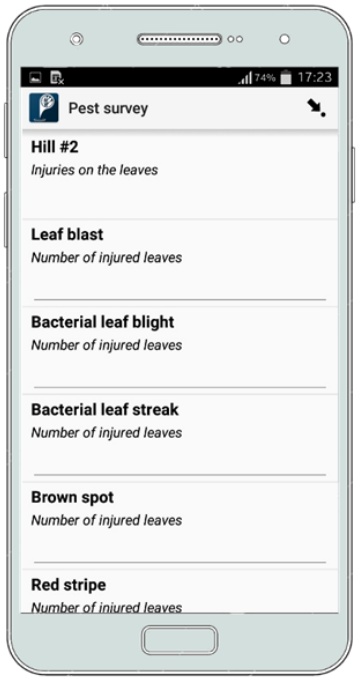




Pest survey
* Water status
With standing water, soil hard
With standing water, soil soft
Without standing water, soil hard
Without standing water, soil soft


Pest survey
* Photo of the field
Take a landscape picture (70% field; 30% sky)
Take Picture
Choose Image

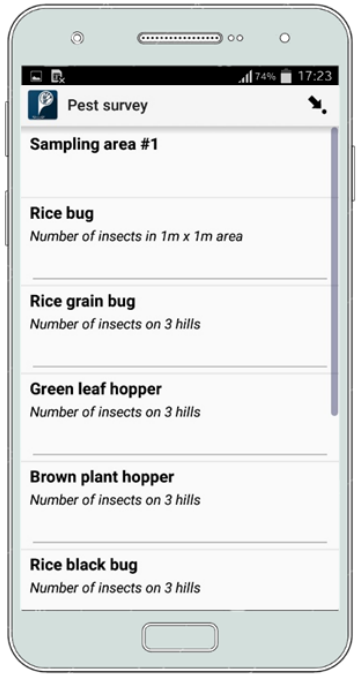

Pest survey
Hill #1
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe

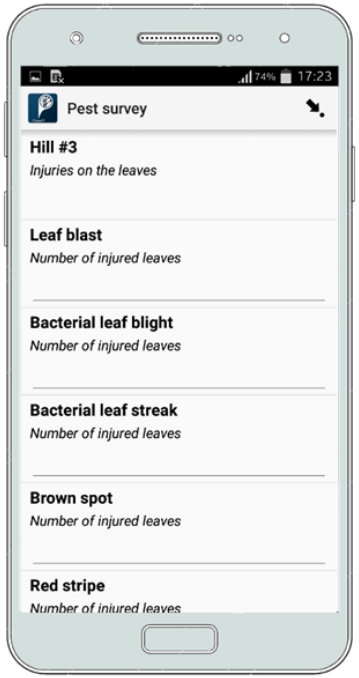

Pest survey
Hill #1
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

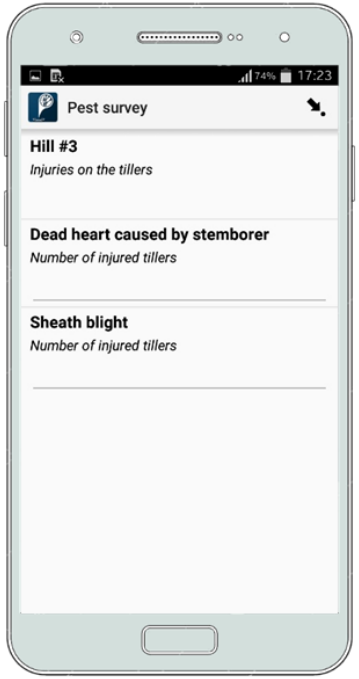

Pest survey
Hill #2
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe

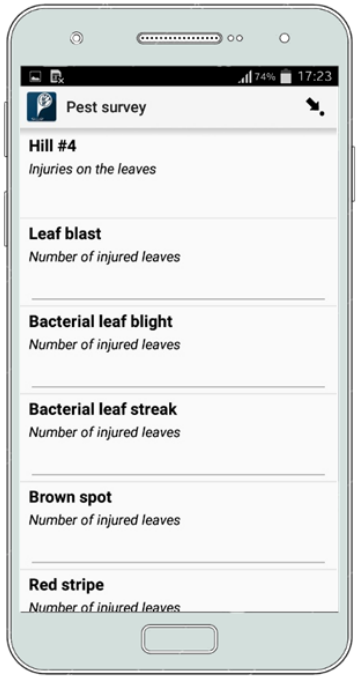

Pest survey
Hill #2
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

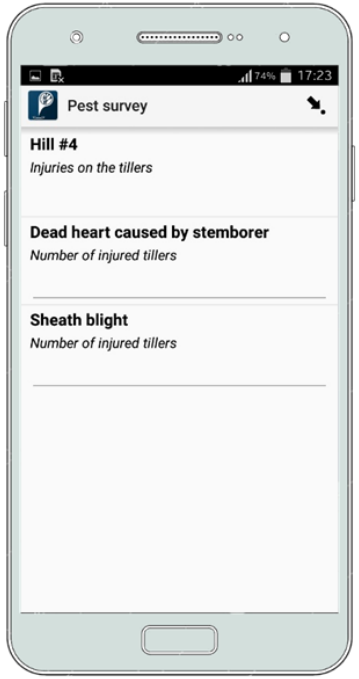

Pest survey
Sampling area #1
You are about to collect population count, systemic injuries, and weed cover assessments. Hill #3 is within sampling area #1

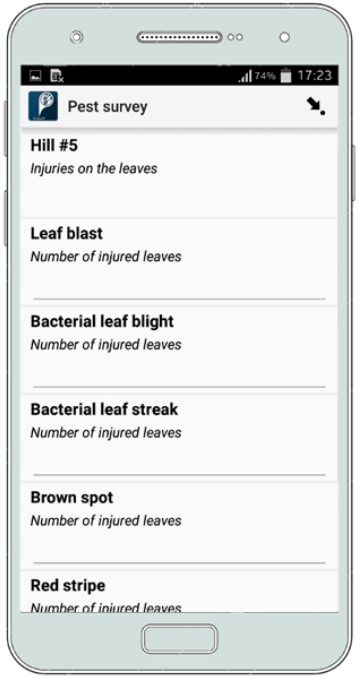

Pest survey
Sampling area #1
Rice bug
Number of insects in 1m x 1m area
Rice grain bug
Number of insects on 3 hills
Green leaf hopper
Number of insects on 3 hills
Brown plant hopper
Number of insects on 3 hills
Rice black bug
Number of insects on 3 hills


Pest survey
Hill #3
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe
Number of injured leaves


Pest survey
Hill #3
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

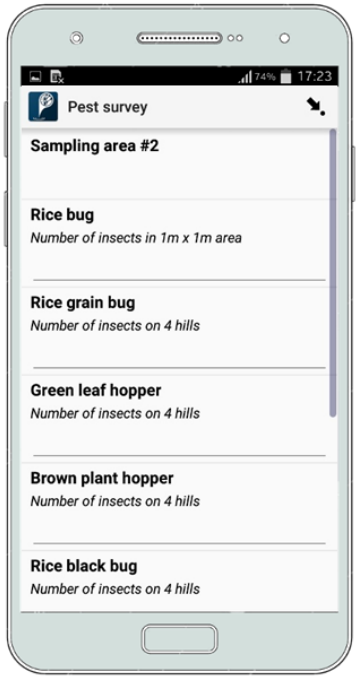

Pest survey
Hill #4
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe
Number of injured leaves

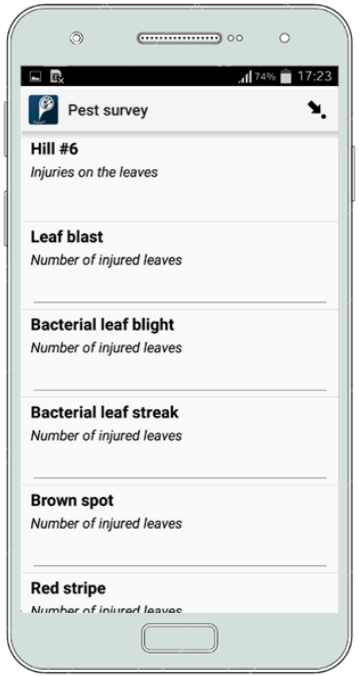

Pest survey
Hill #4
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

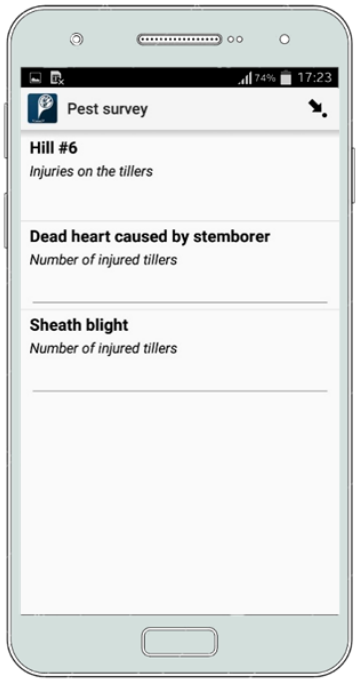

Pest survey
Hill #5
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe
Number of injured leaves

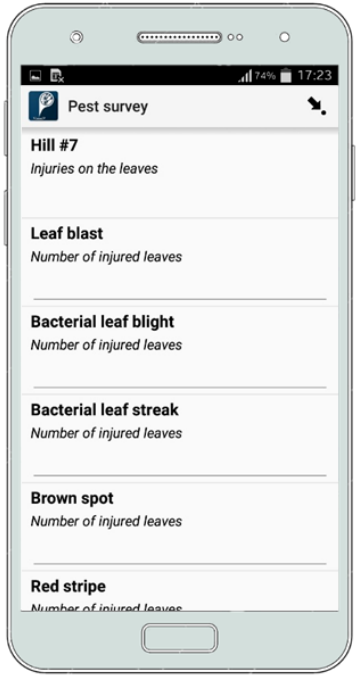

Pest survey
Hill #5
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

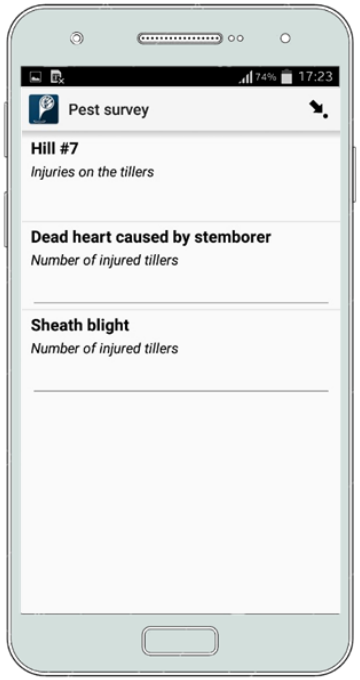

Pest survey
Sampling area #2
You are about to collect population count, systemic injuries, and weed cover assessments. Hill #6 is within sampling area #2


Pest survey
Sampling area #2
Rice bug
Number of insects in 1m x 1m area
Rice grain bug
Number of insects on 4 hills
Green leaf hopper
Number of insects on 4 hills
Brown plant hopper
Number of insects on 4 hills
Rice black bug
Number of insects on 4 hills

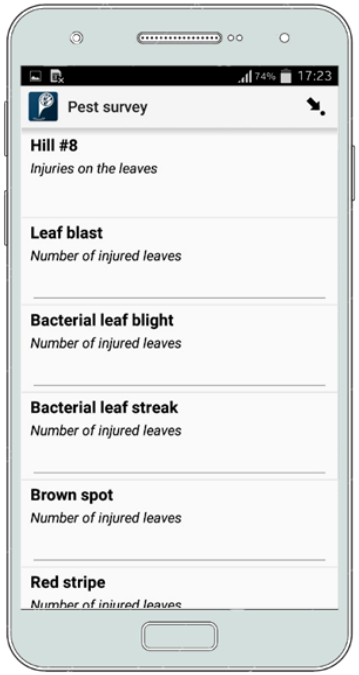

74% 17:23
Pest survey
Hill #6
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe


74% 17:23
Pest survey
Hill #6
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers


74% 17:23
Pest survey
Hill #7
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe

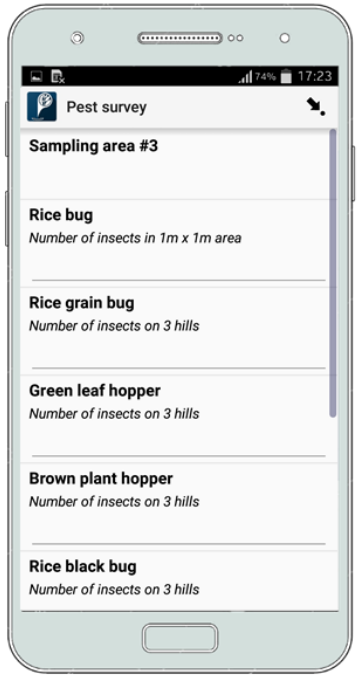

74% 17:23
Pest survey
Hill #7
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

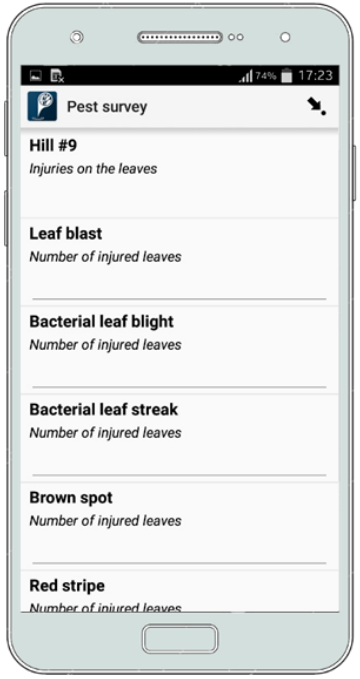


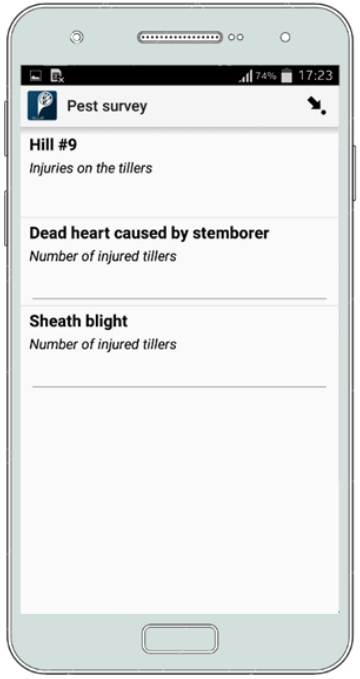

74% 17:23
Pest survey
Hill #8
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe

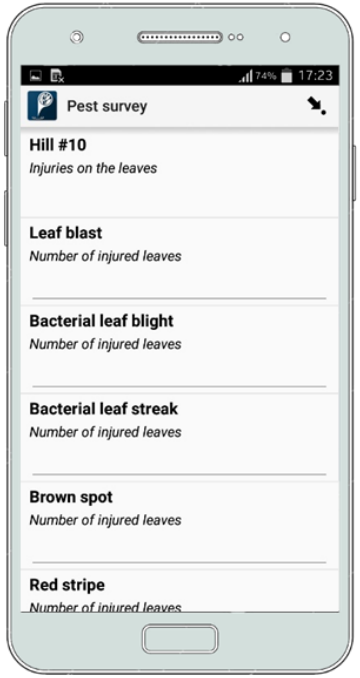

74% 17:23
Pest survey
Hill #8
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers

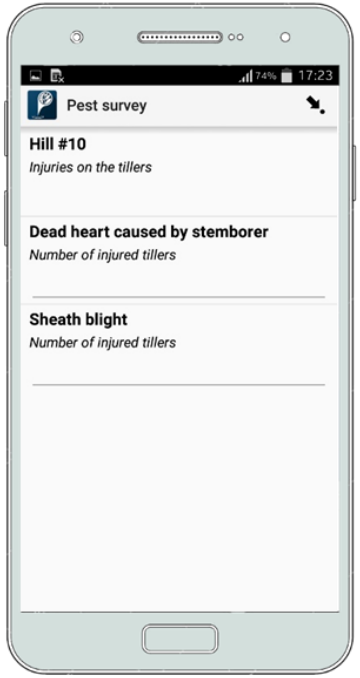

74% 17:23
Pest survey
Sampling area #3
You are about to collect population count, systemic injuries, and weed cover assessments. Hill #9 is within sampling area #3

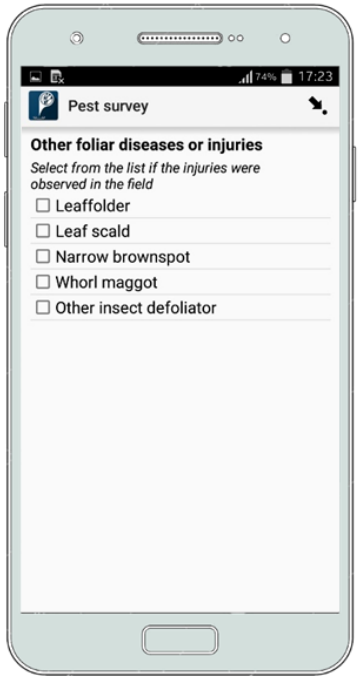

74% 17:23
Pest survey
Sampling area #3
Rice bug
Number of insects in 1m x 1m area
Rice grain bug
Number of insects on 3 hills
Green leaf hopper
Number of insects on 3 hills
Brown plant hopper
Number of insects on 3 hills
Rice black bug
Number of insects on 3 hills

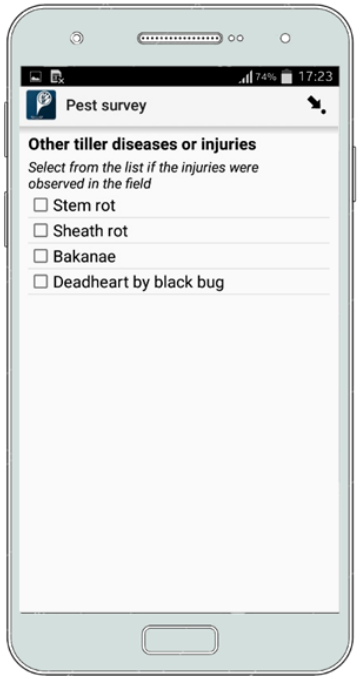

Pest survey
Hill #9
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe

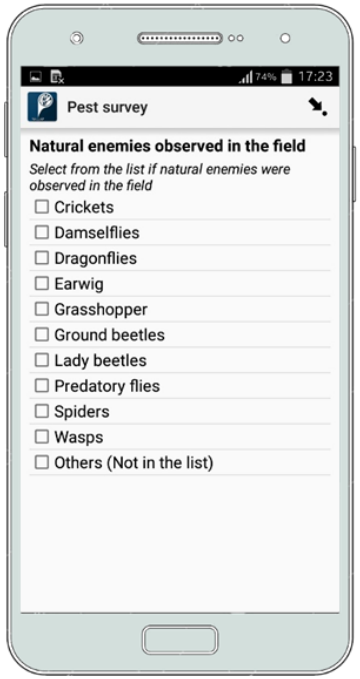

Pest survey
Hill #9
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers


Pest survey
Hill #10
Injuries on the leaves
Leaf blast
Number of injured leaves
Bacterial leaf blight
Number of injured leaves
Bacterial leaf streak
Number of injured leaves
Brown spot
Number of injured leaves
Red stripe


Pest survey
Hill #10
Injuries on the tillers
Dead heart caused by stemborer
Number of injured tillers
Sheath blight
Number of injured tillers


Pest survey
Other foliar diseases or injuries
Select from the list if the injuries were observed in the field
Leaffolder
Leaf scald
Narrow brownspot
Whorl maggot
Other insect defoliator


Pest survey
Other tiller diseases or injuries
Select from the list if the injuries were observed in the field
Stem rot
Sheath rot
Bakanae
Deadheart by black bug


Pest survey
Natural enemies observed in the field
Select from the list if natural enemies were observed in the field
Crickets
Damselflies
Dragonflies
Earwig
Grasshopper
Ground beetles
Lady beetles
Predatory flies
Spiders
Wasps
Others (Not in the list)

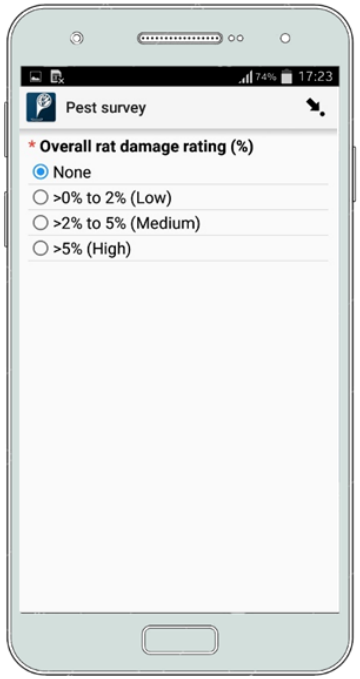

Pest survey
* Overall rat damage rating (%)
None
>0% to 2% (Low)
>2% to 5% (Medium)
>5% (High)


Figure 16. Illustration protocol on collecting pest survey using PRIME Collect App.



## 4. Yield Assessment

Yield is the measurement of the amount of a crop grown, or product which is affected by different biotic and abiotic factors. It is the ultimate measure of success for any pest management applied in the field.

4.1 Objectives

- To determine the yield of farmers every cropping period
- Relate yield to the occurrences of pest

4.2 Materials

- Android-based smart phone installed with PRIME ODK

4.3 PRIME Collect Form

- Yield form

4.4 Data to be collected

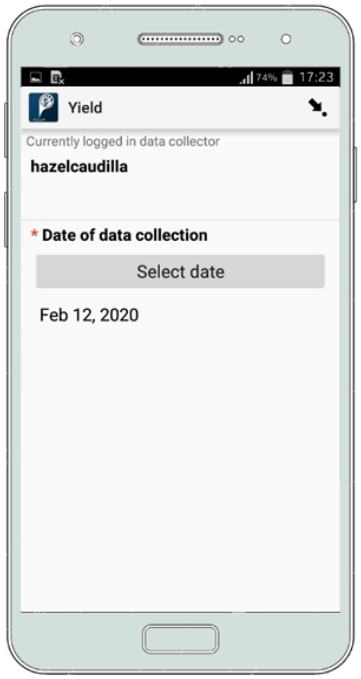
Table 4. List of variables to be collected and corresponding unit of measure for assessing yield.

| Variables | Unit of measurement |
|---|---|
| 1. Date | |
| 2. Farmer's name | |
| 3. Harvest method | |
| 4. Number of sacks harvested (gross) | sacks |
| 5. Average weight per sack | Kilogram (kg) |

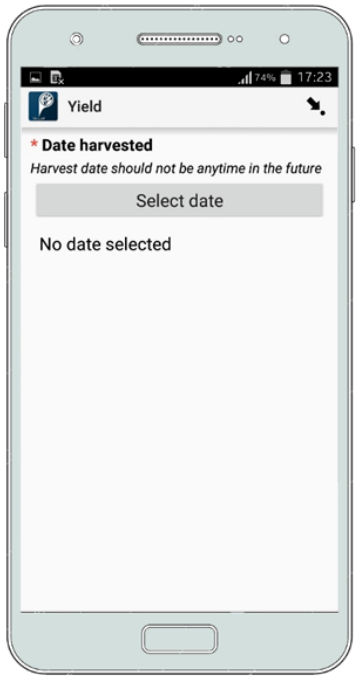
4.5 Procedure

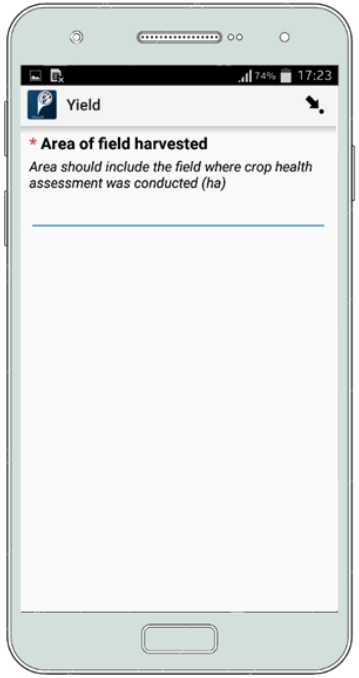
- After harvest, immediately conduct the interview.
- Ask the farmer the gross number of sack of rice harvested.
- Ask the average weight of each sack in kilogram input at yield form.

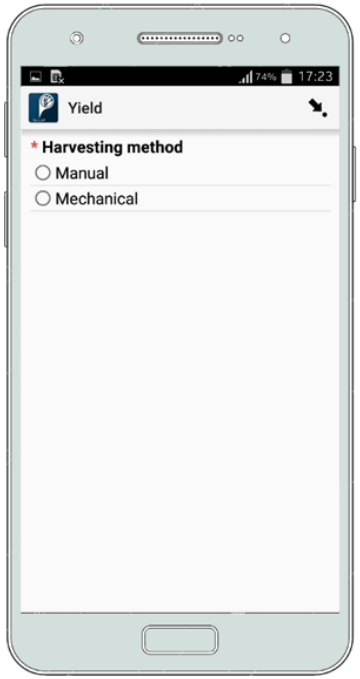
4.3 How to fill Yield ODK form.



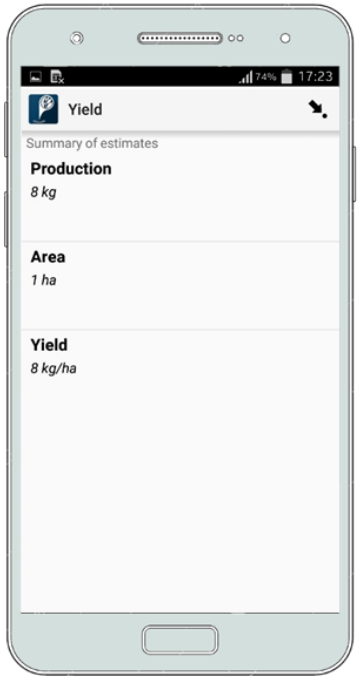








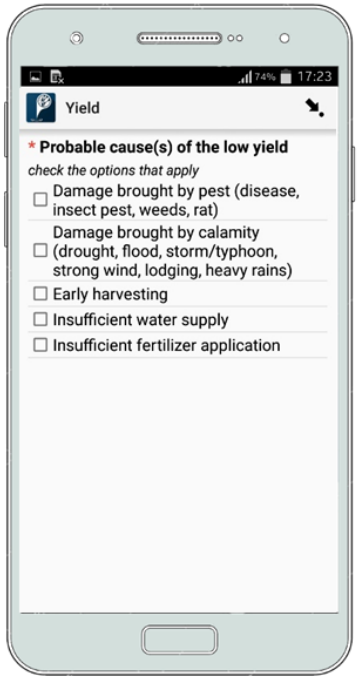




Figure 17. Illustration protocol on collecting yield information using PRIME Collect App.



## REFERENCES

Aplin, K.P., Brown, P.R., Jacob, J., Krebs C.J., and Singleton, G.R., 2003. Field methods for rodent studies in Asia and Indo-Pacific. ACIAR monograph No. 100, Canberra: Australian Centre for International Agricultural Research. 223 p.

IRRI and PhilRice. 2018. Philippine Rice Information System Operations Manual, Volume 1. Los Baños (Philippines): International Rice Research Institute and Science City of Muñoz (Philippines): Philippine Rice Research Institute198 p.

PhilRice, 2020. Philippine Rice Informations System (PRISM). Philippine Rice Research Institute Maligaya, Science City of Muñoz, Nueva Ecija.

Savary S, Castilla NP. 2009. A survey portfolio to characterize yield-reducing factors in rice.

# ANNEXES

## Annex A. Definition of terms

Damage — the monetary value lost to a commodity as a result of the injury by the pest.

Diagnosis — critical determination of a cause resulting to a judgement. Also a deductive, sequential process to identify disease wherein symptoms are usually use as diagnostic standard.

Diagnostic Capability — ability to use of support diagnostic tools such as protein-based (ELISA) and advanced molecular (LAMP) to detect pathogens.

Disease — an abnormal condition that damage and affect the normal function of the host leading to decrease or poor quality yield.

Disease Surveillance — an epidemiological exercise wherein the disease spread is monitored to establish pattern of progression as well as the contributing factors.

Endemic — disease occurs in low level in few plant populations over a long period of time.

Epidemic — rapid increase of disease in large plant population over a short time.

Injury — physical harm to a valued commodity due to the presence/activities of a pest.

Monitoring — the active tracking of the presence, population and movement of pest within a specified area or region.

Outbreaks — large, sporadic (occasional) population increase of pest; when pest population rises significantly above its general equilibrium level.

Pathogen — the agent that causes the disease; either biotic (infectious = bacteria, fungi, virus) or abiotic (non-infectious = water, chemical, temperature).

Pest — any species, strain or biotype of plant, animal or pathogenic agent injurious to plants and plant products.

Pest Scouting — the use of science-based protocols by trained individuals to observe pests in the fields.

Pest Status - data at the farm level that provide essential information of presence of exotic and established rice pests to regional and ultimately to the national biosecurity efforts

Pest Surveillance - a plant biosecurity strategy of regular monitoring rice fields for the presence of plant pest population and knowing the health status of the crop

Pest Survey - a procedure conducted over a defined period to determine the characteristics of a plant pest population or to determine the species that occur in an area

Plant Health Indicators - disease incidence counts that describe the overall plant health condition of a population

Symptom - the manifestation of diseased condition of infected plant

# Annex B. Monitoring Sites in the Philippines

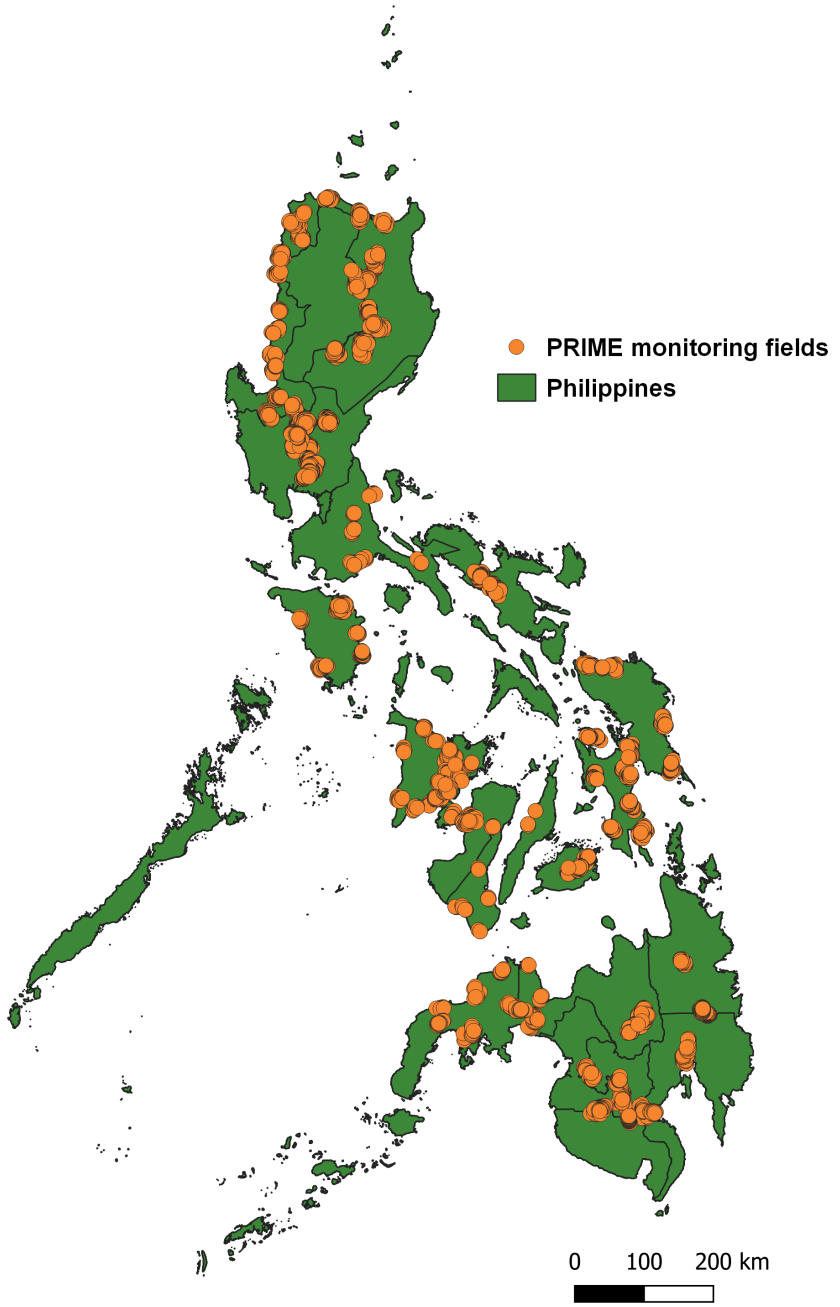



Figure B.1. PRIME monitoring fields in the Philippines as of June 2020.

Table B.1. The number of monitoring fields per municipality based on its rice area.

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| CAR | Kalinga | 16,295 | Tabuk City | 11,521 | 58 |
| | | | Rizal | 3,292 | 16 |
| | | | Pinukpuk | 1,208 | 6 |
| | Apayao | 11,396 | Flora | 3,877 | 19 |
| | | | Santa Marcela | 3,516 | 18 |
| | | | Luna | 2,308 | 12 |
| | Ifugao | 7,222 | Alfonso Lista | 4,668 | 23 |
| | | | Lamut | 1,634 | 8 |
| | | | Aguinaldo | 424 | 2 |
| TOTAL | | | | | 162 |
| Region 1 | Pangasinan | 74,387 | Bayambang | 5,774 | 29 |
| | | | Urdaneta City | 5,250 | 26 |
| | | | Mangatarem | 4,839 | 24 |
| | Ilocos Norte | 14,703 | Dingras | 2,445 | 12 |
| | | | Bacarra | 1,686 | 8 |
| | | | Pagudpud | 1,328 | 7 |
| | La Union | 7,629 | Bangar | 1,296 | 6 |
| | | | Balaoan | 941 | 5 |
| | | | Agoo | 937 | 5 |
| TOTAL | | | | | 122 |

*1 monitoring field per 200 hectares (PRISM 2020)



Table B.1 (cont'd).

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring sites)* |
|---|---|---|---|---|---|
| Region 2 | Isabela | 147,293 | Alicia | 13,735 | 69 |
| | | | Cauayan City | 11,407 | 57 |
| | | | San Mateo | 8,988 | 50 |
| | Cagayan | 126,471 | Solana | 12,570 | 63 |
| | | | Aparri | 8,350 | 42 |
| | | | Baggao | 7,803 | 39 |
| | Nueva Vizcaya | 23,410 | Solano | 4,048 | 20 |
| | | | Bagabag | 3,784 | 19 |
| | | | Bambang | 3,563 | 18 |
| TOTAL | | | | | 377 |
| Region 3 | Nueva Ecija | 172,417 | Guimba | 18,086 | 90 |
| | | | San Antonio | 13,226 | 66 |
| | | | Talavera | 10,085 | 50 |
| | Tarlac | 58,954 | Concepcion | 9,982 | 50 |
| | | | La Paz | 8,378 | 42 |
| | | | Victoria | 8,039 | 40 |
| | Pampanga | 52,027 | Candaba | 12,992 | 65 |
| | | | Arayat | 7,613 | 38 |
| | | | Mexico | 4,990 | 25 |
| TOTAL | | | | | 466 |

*1 monitoring field per 200 hectares (PRISM 2020)

Table B.1. (cont'd).

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 4-A | Quezon | 22,544 | Candelaria | 2,147 | 11 |
| | | | Lopez | 1,967 | 10 |
| | | | Sariaya | 1,798 | 9 |
| | Laguna | 17,762 | Victoria | 2,010 | 10 |
| | | | Mabitac | 1,530 | 8 |
| | | | Santa Cruz | 1,512 | 8 |
| | Batangas | 22,544 | San Juan | 1,224 | 6 |
| | | | Nasugbu | 1,105 | 6 |
| | | | Lian | 833 | 4 |
| TOTAL | | | | | 72 |
| MIMAROPA | Oriental Mindoro | 55,268 | Naujan | 19,990 | 100 |
| | | | Calapan City | 8,980 | 45 |
| | | | Victoria | 4,337 | 22 |
| | Palawan | 37,739 | Narra | 8,731 | 44 |
| | | | Brooke's Point | 5,265 | 26 |
| | | | Rizal | 3,745 | 19 |
| | Occidental Mindoro | 29,910 | Sablayan | 7,465 | 37 |
| | | | Rizal | 5,993 | 30 |
| | | | San Jose | 5,708 | 29 |
| TOTAL | | | | | 352 |

*1 monitoring field per 200 hectares (PRISM 2020)



Table B.1. (cont'd)

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 5 | Camarines Sur | 81,559 | Libmanan | 8,360 | 42 |
| | | | Minalabac | 6,928 | 35 |
| | | | Bula | 6,158 | 31 |
| | Masbate | 30,247 | Cawayan | 6,664 | 33 |
| | | | Milagros | 5,743 | 29 |
| | | | Mandaon | 4,649 | 23 |
| | Albay | 24,902 | Libon | 3,987 | 20 |
| | | | Ligao | 3,085 | 15 |
| | | | Oas | 2,947 | 15 |
| TOTAL | | | | | 243 |
| Region 6 | Iloilo | 104,125 | Pototan | 6,717 | 34 |
| | | | Oton | 5,996 | 30 |
| | | | Dumangas | 5,467 | 28 |
| | Capiz | 44,427 | Dumarao | 5,475 | 27 |
| | | | Panitan | 4,345 | 22 |
| | | | Dao | 4,330 | 22 |
| | Negros Occidenal | 31,550 | Bago City | 10,417 | 52 |
| | | | Valladolid | 2,884 | 14 |
| | | | Himamaylan City | 2,348 | 12 |
| TOTAL | | | | | 237 |

*1 monitoring field per 200 hectares (PRISM 2020)

Table B.1. (cont'd).

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 7 | Bohol | 37,834 | Ubay | 6,750 | 34 |
| | | | Pilar | 3,574 | 18 |
| | | | Carmen | 3,363 | 17 |
| | Negros Oriental | 8,128 | Bayawan | 2,286 | 11 |
| | | | Canlaon | 1,865 | 9 |
| | | | Ayungon | 650 | 3 |
| | Cebu | 1,646 | Pinamungahan | 372 | 3 |
| | | | Toledo city | 245 | 1 |
| | | | Carcar | 207 | 1 |
| TOTAL | | | | | 97 |
| Region 8 | Leyte | 69,846 | Ormoc City | 6,950 | 35 |
| | | | Alangalang | 6,302 | 32 |
| | | | Abuyog | 4,810 | 24 |
| | Northern Samar | 18,468 | Catubig | 2,663 | 13 |
| | | | Laoang | 2,591 | 13 |
| | | | Las Navas | 2,367 | 12 |
| | Samar | 14,226 | Basey | 3,210 | 16 |
| | | | Santa Rita | 2,664 | 13 |
| | | | Gandara | 1,664 | 8 |
| TOTAL | | | | | 166 |

*1 monitoring field per 200 hectares (PRISM 2020)



Table B.1. (cont'd)

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 9 | Zamboanga del Sur | 40,670 | Mahayag | 5,912 | 30 |
| | | | Tambulig | 5,524 | 28 |
| | | | Labangan | 3,826 | 19 |
| | Zamboanga Sibugay | 17,885 | Diplahan | 4,353 | 22 |
| | | | Titay | 4,204 | 21 |
| | | | Siay | 3,903 | 20 |
| | Zamboanga del Norte | 14,499 | Polanco | 1,993 | 10 |
| | | | Sindangan | 1,905 | 10 |
| | | | Dipolog | 1,892 | 9 |
| TOTAL | | | | | 169 |
| Region 10 | Bukidnon | 40,171 | Valencia City | 13,981 | 70 |
| | | | Malaybalay City | 6,683 | 33 |
| | | | Maramag | 4,198 | 21 |
| | Lanao del Norte | 16,616 | Lala | 7,185 | 36 |
| | | | Kapatagan | 2,945 | 12 |
| | | | Sultan Naga Dimaporo | 1,736 | 9 |
| | Misamis Occidental | 7,501 | Bonifacio | 1,416 | 7 |
| | | | Plaridel | 1,254 | 6 |
| | | | Ozamis Ciity | 800 | 4 |
| TOTAL | | | | | 198 |

*1 monitoring field per 200 hectares (PRISM 2020)

Table B.1 (cont'd).

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 11 | Davao del Norte | 14,844 | Asuncion | 3,151 | 16 |
| | | | Santo Tomas | 2,838 | 14 |
| | | | Barulio E. Dujali | 2,782 | 14 |
| | Davao del Sur | 13,736 | Matanao | 4,529 | 23 |
| | | | Magsaysay | 3,377 | 17 |
| | | | Hagonoy | 2,092 | 10 |
| | Compostela Valley | 13,179 | Compostela, | 4,536 | 23 |
| | | | Nabunturan | 2,535 | 13 |
| | | | Montervista | 1,947 | 10 |
| TOTAL | | | | | 140 |
| Region 12 | North Cotabato | 54,239 | M'Lang | 12,424 | 62 |
| | | | Midsayap | 7,846 | 39 |
| | | | Kabacan | 7,203 | 36 |
| | Sultan Kudarat | 46,300 | Lambayong (Mariano | 9,776 | 49 |
| | | | Isulan | 6,968 | 35 |
| | | | President Quirino | 5,498 | 27 |
| | South Cotabato | 33,477 | Norala | 8,151 | 41 |
| | | | Santo Niño | 5,901 | 30 |
| | | | Koronadal City | 5,494 | 27 |
| TOTAL | | | | | 346 |

*1 monitoring field per 200 hectares (PRISM 2020)



Table B.1. (cont'd)

| Region | Top 3 Major Rice Producing Provinces | Area (ha) | Top 3 Major Rice Producing Municipalities | Area (ha) | Points (Monitoring fields)* |
|---|---|---|---|---|---|
| Region 13 | Agusan del Sur | 45,316 | Veruela | 6,405 | 32 |
| | | | San Francisco | 6,162 | 31 |
| | | | Bayugan City | 4,803 | 24 |
| | Surigao del Sur | 20,887 | San Miguel | 6,152 | 31 |
| | | | Tago | 4,954 | 25 |
| | | | Cantilan | 2,220 | 11 |
| | Agusan del Norte | 13,132 | Butuan City | 7,643 | 38 |
| | | | Remedios T. Romulaldes | 1,611 | 8 |
| | | | Cabadbaran City | 1,083 | 5 |
| TOTAL | | | | | 205 |
| BARMM | Maguindanao | 41,525 | Datu Abdullah Sangki | 5,178 | 26 |
| | | | Datu Paglas | 4,376 | 22 |
| | | | Ampatuan | 3,720 | 19 |
| | Lanao del Sur | 9,607 | Lumba-Bayabao | 1,125 | 6 |
| | | | Bubong | 1,112 | 6 |
| | | | Masiu | 1,020 | 5 |
| TOTAL | | | | | 158 |

*1 monitoring field per 200 hectares (PRISM 2020)