

ANALYSIS OF ADVICE QUALITY IN CROP CLINICS ON RICE PROBLEMS IN SRI LANKA

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ABSTRACT

As a staple food crop, rice is important for the food security of Sri Lanka; but yield is affected by many factors. Crop clinics are a supportive tool to the existing agricultural extension system which can deliver quality advice to farmers. The present study evaluated crop clinic data on the diagnosis of rice plant health problems as well as plant protection advices for farmers in Sri Lanka. A total of 1,032 crop clinic queries, as captured in the database of the Plant-wise Online Management System were analysed for the period between June 2012 and August 2016. The validity of diagnosis based on symptom descriptions made for crop samples brought by farmers to the clinics were evaluated. More than 60% of the queries were correctly diagnosed. More than 50% of valid recommendations were observed and it was not significant over the time. To assess the relationship between correct diagnosis and valid recommendations with Plant Doctor's extension experience, regression analyses were used. There was no significant trend of correct diagnosis and valid recommendations with growing agricultural extension experience. The study recommends advanced training for Plant Doctors to improve symptoms description and quality of recommendations.

Key words: Crop clinics, Diagnosis, Plant-wise, Quality of advices.

INTRODUCTION

Rice (*Oryza sativa*) is the most important staple food crop in Sri Lanka. Among agricultural land use, rice farming occupies 34% (DOA, 2017). Production of rice may suffer due to various biotic and abiotic factors. Arthropod pests, diseases and weeds are major constraints as biotic factors (Seck *et al.*, 2012). Conversely, soil problems, nutrient deficiencies and physiological disorders may lead to reduced rice yield. Rice production is served by a well-organized agricultural extension system in Sri Lanka. A crop clinic program, as part of the Global Plant-wise program (Danielson *et al.*, 2013), was implemented in Sri Lanka from 2009 onwards. Agriculture instructors have been trained as

'Plant Doctors' by offering two training modules of plant clinic developed by Plant-wise. Once trained, the Plant Doctors provide on-the-spot diagnosis and advice for farmers who bring plant health queries to the clinics. Problems reported to crop clinics have been recorded using standard prescription forms developed by Plant-wise. Those recorded data are uploaded to a database, called the Plant-wise Online Management System (POMS) (Leach *et al.*, 2013), by the data manager in the country. It is a secure-access mode with restricted public use. As a national program, crop clinic records can be used to generate useful information on farmers' priority problems and changing the status of pests and diseases of various crops. Hence, it facilitates to develop timely relevant specific crop protection measures. The present study, therefore, attempted to analyse crop clinics data to improve quality of advices and recommendations given by Plant Doctors with relevance to pest control in rice.

MATERIALS AND METHODS

Data which were recorded at crop clinics held in Sri Lanka from 2012 June to 2016 August were used. They had been captured in the database of the POMS. Total 1,777 clinic sessions were held under 583 of plant clinics up to August 3rd 2016. Crop clinics received 7,235 of total queries from 5,640 farmers during the time period. Among all farmer queries to clinics that were recorded on different crops, 1,032 rice problems were selected for further analysis. The validity of diagnosis was evaluated by using "major symptoms", "description of the problem" and the "problem type" written down by Plant Doctors on the prescription form. Key symptoms were considered to identify whether the diagnosis is correct or not. When some or all symptoms that have been described were not associated with a particular pest, disease or an abiotic problem, it was considered as incorrect diagnosis. Incorrectly diagnosed queries were further grouped as Reject (symptoms only), Reject due to mixed diagnosis and Reject due to symptoms does not support to diagnosis. Correctly diagnosed queries were further divided into four categories i.e. Diseases, pest, weeds and abiotic problems. These four categories were assessed to find out which category was most difficult to diagnose correctly by Plant Doctors. Relationships of correct diagnosis queries over years was evaluated using regression analysis in MS excel. Validity of recommendations was done according to Table 1.

Table 1. Validity outcomes for the recommendations.

Effective recommendation	Safe recommendation	Validation outcome
No recommendation given		Reject
No	-	Reject – not effective
Yes	No	Reject – not safe
Yes	Yes	Valid recommendation
Partial	Yes	

Relationship of valid recommendations over years was evaluated using regression analysis procedure in MS excels. Given recommendations recognized as valid were further evaluated to assess their quality according to Table 2.

Table 2. Categories used for the analysis of quality of recommendations.

Comprehensive recommendation	Detailed recommendation	Validation outcome	Quality category of recommendations
Yes	Yes	Comprehensive and detailed	Complete
Yes	No	Only comprehensive	Partial complete
No	Yes	Only detailed	
No	No	Not comprehensive and not detailed	Not complete

To assess whether the validity of diagnosis and recommendation depends on working experience of Plant Doctors, regression analyses procedure in MS Excel was used. Years of experience of agriculture instructors under Department of Agriculture, Sri Lanka which was recorded in POMS within their profile data were used. Information missing about years of experience in the POMS was collected from Assistant Directors of Agriculture and Subject matter officers in Sri Lanka through emails and social media. The analysis was done by creating blocks of agricultural extension experiences in 5 year steps (1-5 years, 10-15 years and 15-20 years).

RESULTS

Among 1,032 queries on rice, 700 queries were recognized as correct with the described symptoms according to validation processes. The result show more than 60% of correct diagnosis in each year (Figure 1). The relationship between correct diagnosis and years of crop clinics held was not significant ($R^2=0.24$, $t=0.98$, $P=0.39$). Among the incorrect diagnosed queries from 2012 June to 2016 August, 80% (Table 4) were rejected due to symptoms descriptions not supporting the problem diagnose. Number of incorrect diagnoses (n) = 332 out of 1,032. Abiotic problems were difficult to diagnose by using described symptoms which were observed only half of queries from 2012 June to 2016 August as correctly diagnosed (Figure 2). The number of total queries taken by farmers to clinics was shown above the bars. The result show more than 50% of valid recommendations in each year (Figure 3). The relationship between valid recommendations and years was not significant ($R^2=0.77$, $t=3.15$, $P=0.05$). The number of queries in a given year is shown above the bars.

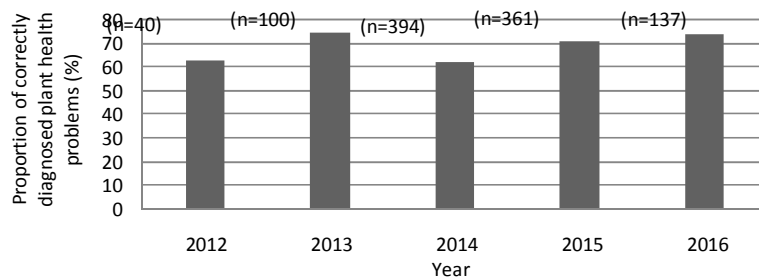


Figure 1. Proportion of correctly diagnosed plant health problems in rice, Sri Lanka in crop clinics over time, the number of plant health problems in a given year is shown above the bars.

Table 4. Proportion of farmer queries at plant clinics with non-correct diagnosis of plant health problems by Plant Doctors in rice crop.

Category of non-correct diagnosis	Proportion of queries (%)
Reject	12
Reject due to mixed diagnosis	8
Reject due to symptoms do not support to diagnosis	80

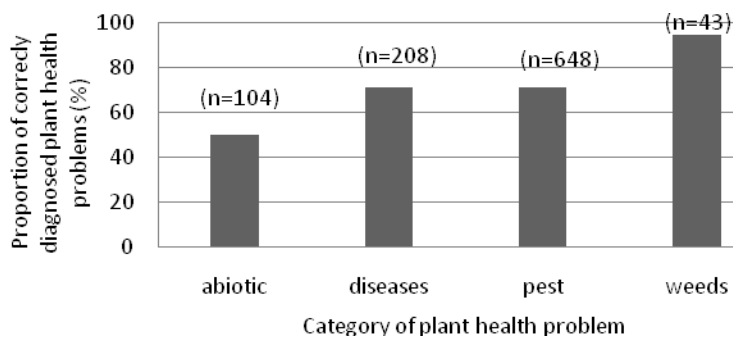


Figure 2. Proportion of correctly diagnosed plant health problem groups in crop clinics in rice.

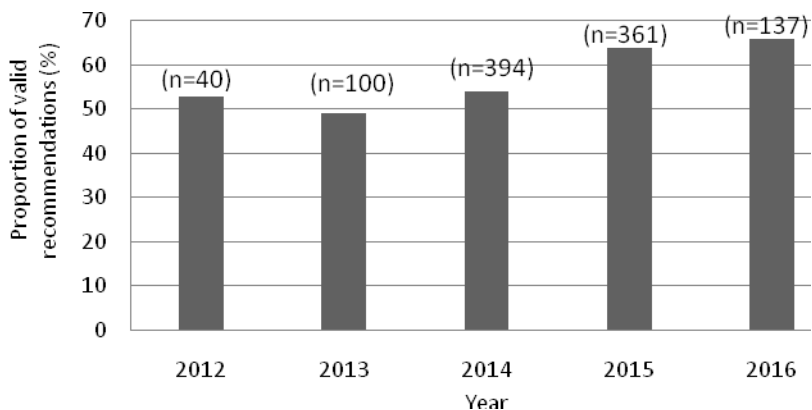


Figure 3. Proportion of valid recommendations made by Plant Doctors to manage the plant health problems.

About 45% of the valid recommendations made from 2012 June to 2016 August was not complete (Figure 4). Complete and partially complete recommendations were 17% and 38% respectively. The number of total queries (n) is 604 in Sri Lanka.

There is no significant relationship with correct diagnosis and to plant doctor’s working experience ($R^2=0.36$, $t =-0.75$, $P=0.59$) (Figure 5). Moreover, there is no significant relationship between plant doctor’s working experience and valid recommendation ($R^2=0.31$, $t =-0.67$, $P=0.62$) (Figure 5). The number of queries in a given group is shown above the bars.

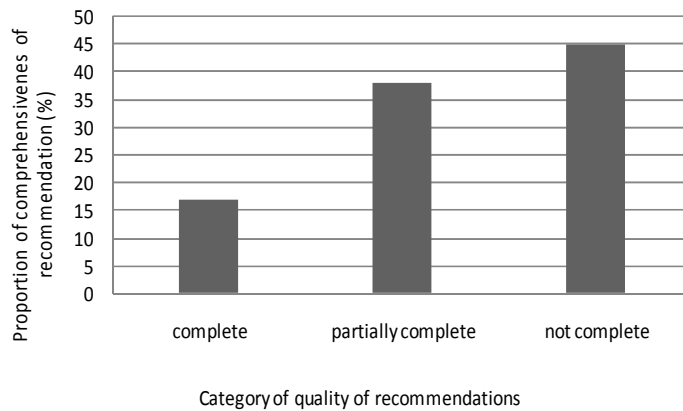


Figure 4. Comprehensiveness of recommendations made by Plant Doctors on managing plant health problems queried taken by farmers at plant clinics.

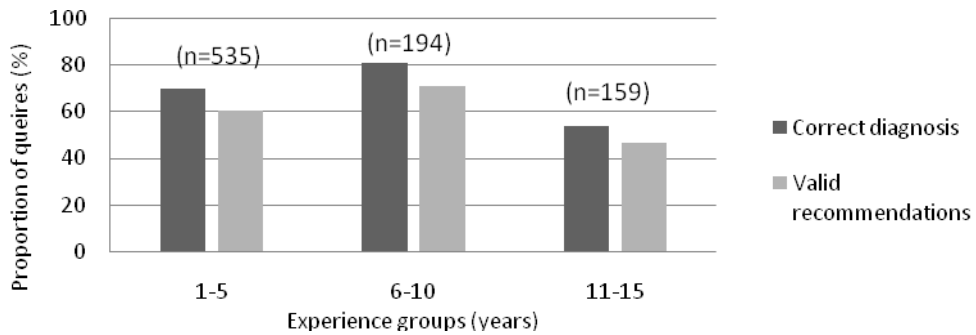


Figure 5. Proportion of queries of correct diagnosis and valid recommendations and doctor's working experience in agricultural extension.

Plant Doctors who conducted plant clinic during year 2012 to 2016 were able to diagnosis rice health problems correctly. However qualities of recommendations done were poor. There was no significant improvement of quality of recommendations with the time and with working experience of Plant Doctors.

CONCLUSION

Plant clinic a novel tool for agriculture extension and a better understanding of performances of plant clinics is essential for strengthening of permanent plant clinic program. It would be better to distribute catalogues for identification of abiotic problems and conducted some practical sessions to

identify different abiotic problems which showing similar symptoms of pest and diseases. Description of symptoms was poor in many problems. Therefore, it is suggested to conduct further training on proper description of rice plant health problems for Plant Doctors. Percentage of valid recommendations done was not correlated with years of plant clinic conducted. It would be better to conduct refresher training to improve quality of recommendations. Extension experience of Plant Doctors were not significantly related to correct diagnosis and valid recommendations made. It is recommended to conduct further analysis on this would be useful after some years. As rice does not reflect the whole figure of plant clinics quality, studies on the other crops would also be useful in drawing up sound conclusions as the effectiveness of crop clinics. Follow up checks are needed with farmers who received advice to assess trend of continuous participation of farmers to the plant clinics and farmer's perception regarding the advices they received to improve quality of plant clinics.

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