ASSESSMENT OF RICE *(ORYZA SATIVA)* DISEASES IN SELECTED G.N. DIVISIONS IN BATTICALO DISTRICT

S.L.Rasmiya Begum[1*] and A.N.M.Mubarak[2]
[1,2]Department of Biosystems Technology, Faculty of Technology, South Eastern University of Sri Lanka, Sri Lanka
imara@seu.ac.lk

ABSTRACT

Rice diseases are considered to be the major limiting factor in rice production and improper control measures without definite knowledge on rice diseases result in higher cost of production. The main aim of the study was to evaluate rice diseases in selected G.N.divisions of Sithandi, Karadiyanaaru and Eravur. 75 random paddy farmers were interviewed with structured questionnaire. Followed by a quadrate (1'×1') was used to assess the type of diseases prevailed in the field. Disease prevalence was calculated as the proportion of fields showing the disease, out of the total number of fields assessed. Disease incidences were determined as the proportion of plants showing symptoms, expressed as a percentage of the total number of plants assessed. From the survey findings it was noted that 10 rice varieties such as BW 361, BG 360, BG 356, BG 300, AT 308, AT 362, LD 365, BG 357, BG 358 and BG 352 were cultivated all over the study area. Further, results of the field assessment revealed that blast and sheath blight were found to be more prevailed diseases with 88% and 86.7% respectively. Further blast and sheath blight showed highest incidence with respective percentages of 35.3% and 41.7%. Out of 10 varieties cultivated across the selected paddy fields, variety AT308 and BG360 were found to be more susceptible for blast and sheath blight respectively while the variety BG 358 was resistant for blast and blight. Therefore, farmers in these regions were suggested to cultivate the varieties which are more resistant for blast and sheath blight compare to others and to adopt field management practices at optimum levels.

Keywords: Blast, Incidence, Prevalence, rice varieties and Sheath blight

1. INTRODUCTION

The district Batticalo falls under low country dry zone agro ecological region and climate is characterized by high temperature ranges from 23-36° C and receives annual rainfall between 864-3081mm. Population in this district is highly dependent on Agriculture for their economic survival. Paddy cultivation is a prominent sector which is being practiced since ancient times. Recent statistical reports showed respective extents of 61483 ha and 27237 ha are utilized for paddy cultivation in both maha and yala seasons under rainfed and irrigation schemes either from major or minor irrigation tanks in Batticalo district (Department of Census, 2013). However, there was a decline in the contribution of Agriculture sector to the Gross Domestic Product (GDP) of country from 2008 onwards (Central Bank, 2013). Lesser production in paddy could be one of the reason for the low GDP contribution and diseases are considered as major constraints in paddy production and responsible for yield losses.

Plant disease is defined as an impairment of physiological functioning of plant or plant parts caused by biotic factors such as bacteria, fungi, protozoa, nematodes and virus. The development and outbreak of diseases are closely

ISBN 978-955-627-120-1

interrelated to susceptible host, virulent pathogen and conducive environment. Several studies indicate that blast, sheath blight, brown spot and false smut are of major economic important diseases in paddy cultivation in Sri Lanka. The accurate diagnosis and timely solving of these diseases are vital important in crop management which assures optimum uses of inputs for enhanced productivity. The diseases are characterized with visual symptoms present in the aerial parts of rice crops. The blast is characterized with the symptoms of spindle shaped lesions with brown or reddish-brown margins, ashy centers and pointed ends. Symptoms of sheath blight are oral or ellipsoidal or irregular shaped lesions banded with green, brown and orange colouration. Lesions are greenish white in the center with brown margins (Hodgson *et al*, 2011). However, diagnosis and identification of these diseases and differentiation of diseases from nutrient deficient symptoms are such difficult to poor farmers. Therefore, a study on assessment of rice diseases was carried out with structured questionnaire followed by the field observation

2. MATERIALS AND METHODS

A preliminary study consisted of 2 phases; questionnaire survey and field assessment was conducted during mid-May to late August, 2013 which falls in the season of South-West monsoon (Yala) among the randomly selected 75 paddy farmers in Sithandi, Karadiyanaaru and Eravur Grama G.N.divisions in Batticaloa district. Followed by the survey, paddy fields of respective farmers were observed for disease assessment. For that quadrate (1'×1') was thrown two times in each field and total number of plants, number of infected plants were counted and recorded each time. Disease prevalence and incidence were calculated by the methods suggested by Mounde *et al.* (2009) and Teng and James (2002) respectively using the following equations.

$$\text{Disease Prevalence} = \frac{\text{Number of fields with the disease}}{\text{Total number of field assesed}} \text{X100}$$

$$\text{Disease incidence} = \frac{\text{Number of infected plant units}}{\text{Total number of units assessed}} \text{X100}$$

Further, inherent capability of host (Plant behavior) with respect to diseases incidence percentage were classified as resistant (0-15%), moderately resistant (15.1-30%), moderately susceptible (30.1-50%) and susceptible (50.1-100%) of disease incidence (Chuwa *et al.*, 2014). Disease identifications were conducted as previously suggested in the guide of rice diseases (Hodgson *et al*, 2011). Data collected in the study were spread in the MS Excel sheets. Prior to the analysis data were tested for normality.

ISBN 978-955-627-120-1

Mean, standard error, standard deviation for each individual parameter were calculated using standard formulas.

3. DISCUSSION AND RESULTS

3.1 Survey Findings

Data obtained from survey revealed that 10 rice varieties were cultivated across the study area (Table 1). Farmers involved in inter seasonal cultivation of paddy with the use of irrigation tank primarily Unnichai. Even though, most of the farmers applied recommended amount of fertilizers and agrochemicals, some farmers applied fertilizers beyond the recommended levels by Department of Agriculture to attain quick response and higher yield as well. Usage of agrochemical was found to be high in order to control pest and diseases since farmers are not well aware to differentiate pest and disease attack. Very lesser number of farmers were subjected to control of diseases by means organic formulation and integrated management.

Table 1: List of Varieties Cultivated in Study Area

Varieties	No of fields observed
AT-308	8
AT-362	6
BG-300	9
BG-352	6
BG-356	5
BG-357	3
BG-358	9
BG-360	12
BW-361	7
LD-365	10
Total	**75**

3.2 Field Assessment

Table 2 shows the prevalence of types of diseases in the selected paddy fields. It indicates that blast and sheath blight were found to be the more common diseases in the study area since 66 fields were shown symptoms of blast and 65 with sheath blight. The prevalence for blast was higher (88%) compare to other diseases of paddy and followed by sheath blight (86.7%).

Table 2: Prevalence of Various Rice Diseases

Types of diseases	No of fields observed	Prevalence (%)
Blast	09	12
Sheath blight	08	10.7
Blast and sheath blight	57	76
No diseases	01	1.3
Total	75	100%

ISBN 978-955-627-120-1

Inherent capability of host with respect to disease incidence percentage is shown in Table 3. It reveals that larger number of fields were observed with moderately resistant range for blast and sheath blight. This might be due to the extensive use of agrochemicals which was found from survey by farmers in order to control pest and diseases. In contrast, very few number of fields were observed with moderately susceptible range. It might be due to the varieties cultivated in these field had different genetic characteristics responsive to diseases regardless of usage of agrochemicals. In addition, survey results revealed that farmer's field very closer to water source had an ease of access to water. Thus, lead to high wetted condition of soil and favour the development of disease. Further to maintain the greenish appearance farmers applied more nitrogenous fertilizer that attracts pests whose are the harbours for the disease causing pathogen.

Table 3: Distribution of Disease Incidence Percentage and Inherent Capability of Host over the Observed Fields

Disease incidence range (%)	**Inherent capability of host**	**Number of fields**	
		Blast	**Sheath blight**
0-15	Resistant	28	35
15.1-30	Moderately resistant	37	33
30.1-50	Moderately susceptible	10	7
50.1-100	Susceptible	-	-
	Total	75	75

Relationship between the average incidence and influence of varieties for blast, sheath blight is shown in the Figure 1. It explains that susceptibility for these diseases varies among the varieties. In general, almost all the varieties had disease incidence percentage of above 15%. Amongst, the variety AT 308 was more susceptible for blast and showed higher average incidence percentage (22.2%). On the other hand, variety BG 358 (10.4%) was comparatively highly resistant for blast than the other varieties. Similarly, highest incidence for sheath blight (19.3%) was observed in variety BG 360 and found to be more susceptible and variety BG 358 more resistant with lowest incidence (12.7%). These findings imply that the varieties had substantial impact on disease development in rice. Ultimately variation observed in prevalence and incidence for rice diseases in the study could be attributed to genotype of varieties, physiological behavior (crop growth stage), agronomic practices such as improper land preparation, late germination, high density planting, late planting and the influence of environmental factors on development and outbreak of disease. Similar results of higher percentages of prevalence and incidence for blast were supported by Wasihun and Flagote (2016).

ISBN 978-955-627-120-1

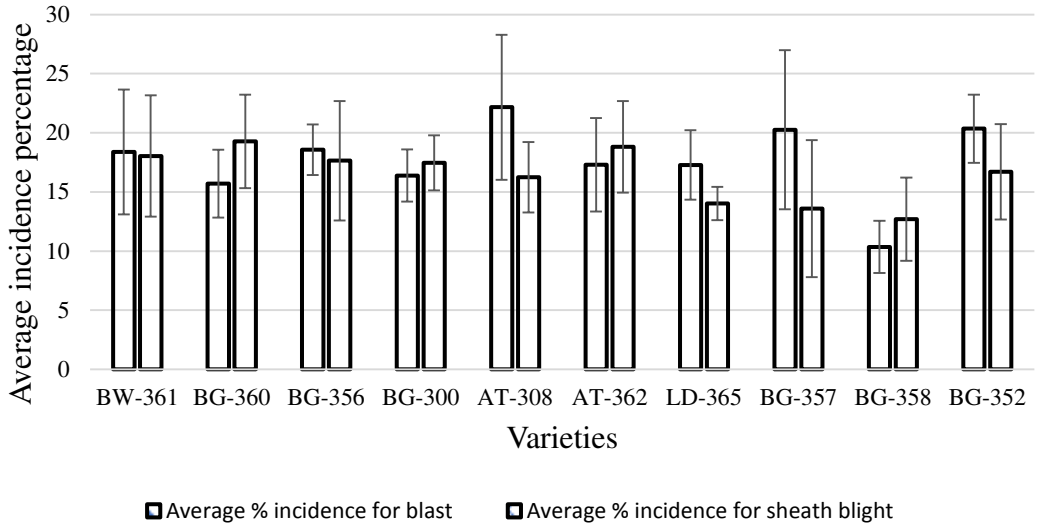

Figure1: Effect of Varieties on Disease Incidence

4. CONCLUSION AND SUGGESTIONS

Paddy cultivation in selected G.N. divisions was remarkably affected from the fungal and bacterial diseases. The blast and sheath blight were found to be the more prevailed diseases in study area with the variations in varieties and agronomic practices adopted by farmers. Therefore, farmers are advised to minimize the cultivation of susceptible varieties and to cultivate the resistant varieties in this area unless they are suggested to use the farm inputs such as irrigation, fertilizers at recommended levels at appropriate time in cultivation of these varieties. Furthermore, the study lacks in co-relation between the responsive factors of disease development and relationship between the susceptibility of diseases and genotype of varieties could be studied in future researches.

5. REFERENCES

Chuwa,C.J., Mabagala, R.B., & Reuben. M.S.O.W (2015). Assessment of Grain Yield Losses Caused by Rice Blast Disease in Major Rice Growing Areas in Tanzania. *International Journal of Science and Research*. 4(10), 2211-2218.

Central bank of Sri Lanka. (2013). Economic and Social Statistics of Sri Lanka.

Department of Census and Statistics, Sri Lanka. (2013). Agriculture and Environment Statistics Division: Paddy statistics. Available at www.statistics.gov.lk

Hodgson, E., Mallarino, A., McGrath, C., Mueller, D., O'Neal, M., Pedersen, P., Pilcher, C., Pope, R., Rice, M., Robertson, A., Sawyer, J., Schaefer, K., Simon, K., Sisson, A., Tylka, G., & Wright, D. (2011). Soybean field guide (2ed edition) *Cooperative Extension Service, Iowa State University of Science and Technology, and the United States Department of Agriculture cooperating, USA.*

ISBN 978-955-627-120-1

Mounde, L.G., Ateka, E.M., Kihurani, A.W., Wasilwa, L., & Thuranira, E.G. (2009). Occurrence and distribution of citrus gummosis (*Phytophthora* spp.) in Kenya. *African Journal of Horticultural Science.,*2, 56-68.

Sugirtharan, M., Delina, E.J.P & Amuthenie,S. (2013). A GIS based study on paddy land degradation in Eravur Pattu DS Division, Batticaloa, Sri Lanka. *International Research Journal of Environment Sciences.* 2(11), 84-87

Teng, P.S., & James, W.C. (2002). Disease and yield loss assessment. *Monsanto Company Makati city, Philippines and ISAAA americenter, Cornell University, USA.*

Wubneh, W.Y. & Bayu, F.A. (2016). Assessment of diseases on rice (*Oryza sativa* L.) in major growing fields of Pawe district, Northwestern Ethiopia. *World Scientific News.* 42, 13-23.

ISBN 978-955-627-120-1