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Research Article

A Review: Flare up of green leaf hopper in early transplanted super fine rice

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Abstract

This article reviews on flare up of leaf hopper a vector of tungro virus in early transplanted Super Fine rice at Tehsil Noshera Virkan and Gujranwala in agro-ecological zone of Adaptive Research Gujranwala during 2011. Pest Scouting survey was conducted to evaluate the infestation of hopper. Success of monitoring system in crop was measured by its ability to provide early detection of vector (green leaf hopper) by using Integrated Pest Management Techniques with the consultation of plant doctors. This article discusses on spectral reflectance of factors controlling the presence of a vector related to tungro outbreak. This recorded information was disseminated to the farming community next year to avoid early transplantation of Super Fine Rice to save their energy and economics.

Keywords: Survey, Green leaf hopper, Vector, Tungro, IPM, Plant Doctors.

Introduction

Rice (*Oryza sativa* L.) is the main staple food, export item in world along Pakistan; it is primary source of energy and protein. The global population is 6.4 billion expected to reach 7.5 billion by 2020 and 9 billion by 2050. Most of the population increase occurs in developing countries like Asia and Africa where rice is a staple food. Rice is cultivated in 154 million hectare with annual production of 60 million tones and average productivity of 3.9 (Sheikh et al., 2011). Rice fetches premium price in worlds market because of its good characteristic, aroma and high yielding variety. Recent years the importance of sustainable agriculture has risen to become one of the most important issues in agriculture. However insect pest and diseases caused major threat to the farmers, so that it is important to find out alternate control measures against disease development to increase yield and quality (Batish et al., 2007). On the other hand the weather and soil conditions influenced the seasonal development and geographical distribution of plant diseases (Jones, 1924). However we should know about the vector of disease development to save economics of the farmer. Heavy doses of nitrogenous fertilizer also effected the disease development in paddy crop (Chaudary et al., 2009). Scientists reported that weather is clearly an important factor in the variability of disease development certainly when there is no fluctuation of relative humidity and temperature (Asia et al., 1967). Severe loss in yield was recorded due to attack of insect pest and pathogens to the paddy (Munoz, 2008). Most diseases infected in Asia on rice crop are directly related to climatic condition (Shahjahan et al., 1986). The timely detection of symptoms and applying IPM techniques are challenging side of disease control (Yao et al., 2009). A tungro vector is directly affected to the crop,

however IPM strategies should be adopted with the consultation of plant doctors to save energy, fuel and economics of farmers under agro-ecological zone of Adaptive Research, Gujranwala.

I-A vector (Green leaf hopper)

Tungro virus is transmitted by six leaf hopper species five of which are in genus Nephotettix. Due to its close biological relationship with rice, green leaf hopper *N. vireseens* (Distant) is the most important vector species (Hibino and Cabunagan, 1986). *N. vireseens* has higher transmission efficiency than other vector species and is usually more abundant in irrigated rice fields. *N. vireseens* lay eggs in patches up to 44 in tissues of leaf sheath of rice tillers (Cheng and Pathak, 1971). After hatching there are 5 nymph stages before adult emergence. At optimum temperature (30-35 ^{o}C) single generation completed in 25 days, hence up to 11 generations are possible in a year in tropical area where there is continuous rice cultivation (Valle et al 1986; Valle et al 2001). Green Leaf hopper become major insect-pest in early transplanted coarse rice especially super fine and is able to transmit rice tungro virus. Haphazard use of chemical pesticides to control the vector would not effective measure due to pesticide residues which effected human health (Iqbal et al 2009). Some times symptoms are detected too late or beyond the action level. The high usage of nitrogenous fertilizers with high temperature triggers the flare up of insect pest population that cause tungro virus (Mark and Camille, 2011). Success of monitoring system can be measured by its ability to provide an early detection of pests that preventing a serious out break (Othman et al 1999).

II-Tungro Outbreak

Diseases in rice crop become one of the most important causes of quality and yield reduction. Tungro is the most important rice virus spread by a vector i.e. green leaf hopper (Ling, 1972). Tungro is one of the most damaging and destructive diseases of rice in Pakistan. Flare up of a vector caused severe infection which affected hundreds of hectares of rice crop and resulted in 100% mortality of rice plants recorded. The damage depends upon variety, early transplantation, plant stage, population of insect pest and climatic conditions. Many of the farmers in South and South East Asia described that rice tungro virus is act as cancer, because of its damage and difficulty of controlling (Azzam and Chancellor, 2002; Wardburtan et al 1997). The most serious tangro infection was reported in 2011 in some villages of Tehsil Noshera Virkan, Gujranwala at agro-ecological zone of Adaptive Research Gujranwala when more than 200 hectares of rice fields were affected by tungro and yield losses about Rs.20 million.

III- Variety

Rice varieties have been determined as major contributor in tungro emergence because some varieties are resistant to tungro (Azzam and Chancellor, 2002). Early transplanted coarse rice (super fine) is most susceptible against this pest than late transplanted.

IV-Immigration of leaf hopper

Green leaf hopper adults in rice crop emigrated from one field to other, regenerated rice plants and volunteers weeds. Early season immigration rates are highest in areas where planting times are highly variable and where overlapping crops are found (Widiarta et al 1990). *N.vireseens* is not a strong flier and usually disperses over short distances; trapping studies suggested that its movement distance was up to 30 km in radius (Cooter et al 2000; Reley et al 1987). Immigration and ovi-position of green leaf hoppers depends upon availability of nutrients in rice plants (Chancellor et al 1997).

Management strategies

Forecasting of Tungro virus

Vector outbreak and its risks in rice grown area induced researchers or plant doctors to study critical epidemiological factors and give forecasting to the farmers about this threat.

Cultural control

1-Virus sources and densities of immigrant vector population should be eradicated. Modeling studies had been suggested that early transplanted coarse rice (Super fine) was most affective than late transplanted (Holt and Chancellor 1997). In Pakistan Tungro virus incidence was highest in early transplanted rice was contradictory to Wardburtan et al (1997).

2-Plants showing symptoms of hopper burn should be removed. However, field trials suggested that rouging was only effective under low disease pressure and hence it was not a practical management strategy for large scale (Tiongo et al 1998).
3- Use resistant varieties of rice.
4-Early transplanted coarse rice (super fine) should be avoided.

Chemical control

1-Scientists suggested that Cypermethrin applied @ 500mlha^{-1} or Acetameprid @ 925 mlha^{-1}were useful for controlling plant hopper compared to other broad-spectrum insecticides (Being et al 1994).

2-Granular application (Cartap Hydrochloride @ 22.5 kg ha^{-1}) would be usedin rice field after thorough pest scouting to overcome vector population. Broadcasting of granules near root zone give better control resulting low leaching losses or degradation of pesticides.

Botanical control

1-In ordered to avoid excessive usage of pesticides, caused undesirable effects to the environment and naturally growing population. Use of Azadirechta @ 500 ml ha^{-1} and extract of *citrus sinensis* @ 500 mlha^{-1} gave better control when sprayed or incorporated in soil. The extract contained polyphenolic compounds that block the spiracle system of insect resulting death of insect (Iqbal et al 2011; Sexena et al 1985).

Conclusion

1-From the survey it was concluded that Integrated Pest Management strategies should be adopted by the consultation of plant doctors. This had been made possible through a combination of strategic planning by Applied Researchers and Adaptive Researchers; Rice breeders; Entomologists; Virologist; Extension worker and farmers. Although tungro virus becomes threat in several countries like Pakistan, however the farmers are advised to avoid early transplantation of super fine rice because survey showed that early transplanted super fine rice is more susceptible than late transplanted.
2- There is dire need to study epidemiological factors and gave forecasting to the farmers about this threat.
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