RESEARCH PAPER

Asian Journal of Bio Science (April, 2010) Vol. 5 Issue 1 : 32-37

Validation and fine-mapping of genetic locus associated with resistance to brown plant hopper [*Nilaparvata lugens* (Stal.)] in rice (*Oryza sativa* L.)

A. SAI HARINI[1], S. SANTHANA LAKSHMI[2], S. SAI KUMAR[1], S. SIVARAMAKRISHNAN[2] AND P. KADIRVEL[1]

[1]Barwale Foundation, Banjara hills, HYDERABAD (A.P.) INDIA

[2]Department of Agricultural Biotechnology, Acharya N.G. Ranga Agricultural University, HYDERABAD (A.P.) INDIA

(Accepted : December, 2009)

In the present study, an attempt was made to validate and fine-map the genetic locus associated with brown planthopper (BPH) resistance locus from IR71033-62-24, a derivative of *O.sativa / O.minuta* cross, using simple sequence repeats (SSR markers). A F_6 segregating population 300 individuals were developed by crossing IR71033-62-24 with a highly susceptible variety, Mahsuri scoring 4.5 and 9.0 (on the scale 1-9) to BPH in greenhouse screening experiments. A subset of 84 F_6 individuals was phenotyped for BPH resistance using a standard seedbox screening test (SSST) under greenhouse conditions. The mean phenotypic score of the subset population was 6.7 and the population was skewed towards the susceptible parent by -0.32. A subset of 61 individuals with extreme phenotypic score was selected from the population for marker trait association analysis. Through single marker analysis,it was found that the BPH resistant locus Bph 22(t) was located at a distance of 6.7cM from the SSR markers RM 585,RM 225,RM 584, RM 19429 and 12.7cM from RM 204 on the long arm of chromosome 6 with a probability value of 0.00.A subset of 75 F_2 lines was also genotyped with the identified markers RM 225, RM 584,RM 19429 and single marker analysis showed the probability value 0.05 in F_2 lines.

Key words : Rice, Brown planthopper, Validation, Fine-mapping, Genetic, Resistance

INTRODUCTION

Rice (*Oryza sativa* L.) is the staple food for about three billion people of the world providing more than 20 to 80 per cent of daily calorie intake. It is also becoming an ideal model plant among cereals for molecular genetic studies due to its relatively small genome size 430 Mb, significant levels of polymorphism, comparatively easy transformability, and large amount of well-conserved genetically diverse materials. Rice genetic resources, comprising land races, modern and obsolete varieties, genetic stocks, breeding lines and wild races are as the basis for the world food security.

During green revolution of the 1960's many high yielding, short duration, semi-dwarf rice varieties were introduced to the farmers. These varieties coupled with greater use of agricultural inputs brought increased yields of rice and lighted the possibility of stable food production in developing countries.

The brown planthopper (BPH) is one such insect pest of rice, which was a minor pest before and emerged as a major pest during green revolution (Dyck and Thomas, 1979). Chemical control using insecticides is harmful, high residual effect and, expensive for poor farmers and it was found neither economical nor safe as it also pose health and environmental risks. There are many resistant varieties in rice germplasm collection, which can be potential donors for BPH resistance genes. At least 19 such genes have been discovered so far (Khush and Brar, 1991; Jena *et al.*, 2005; Chen *et al.*, 2006; Rahman *et al.*, 2009). Many varieties *viz.*, IR26,IR36,carrying single resistance gene in homozygous condition (*Bph1* or *Bph2* or *Bph3*) were also developed and released for cultivation worldwide since 1970. However, such varieties became susceptible, due to adaptation of BPH, and outbreaks continue to occur. Therefore, non-availability of rice cultivars with durable resistance to BPH is a major concern for farmers. Recently, the advent of molecular marker technology has facilitated the identification, mapping and development of gene specific markers for selecting plants carrying specific genes, for the trait of interest, in breeding programmes, the process widely referred as marker-assisted selection (MAS).

MATERIALS AND METHODS

Plant material :

Mahsuri (BF-selection) is highly susceptible to BPH but is of good grain quality type variety cultivated in south