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## APPENDICES

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## ABBREVIATIONS USED

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ARS	: Agricultural Research Station
AVRDC	: Asian Vegetable Research and Development Centre
BLAST	: Basic Local Alignment Search Tool
bp	: base pair
CaCl <sub>2</sub>	: Calcium chloride
ChCl <sub>3</sub>	: Chloroform
CTAB	: Cetyl Trimethyl Ammonium Bromide
DAI	: Days after insect infestation
DAMD	: Direct Amplified Minisatellite DNA
DNA	: Deoxyribonucleic acid
EDTA	: Ethylene diamine tetra acetic acid
F <sub>9</sub>	: Ninth filial generation
g	: gram(s)
GBS	: Genotyping-by-sequencing
H <sub>2</sub> O	: Water
HCl	: Hydrochloric acid
hr	: hour(s)
IAA	: Isoamylalcohol
ICRISAT	: International Crops Research Institute for Semi-Arid Tropics
ISSR	: Inter Simple Sequence Repeats
KCl	: Potassium chloride
kDa	: kilo Dalton
Kg	: Kilogram(s)
Kgf	: Kilogram force
l	: litre
LR	: Landrace
M	: molar
Max.	: Maximum
mg	: Milligram(s)
MgCl <sub>2</sub>	: Magnesium chloride
Min.	: Minimum
min	: minute(s)
ml	: Millilitre(s)
mm	: millimetre
mM	: millimolar
mt	: million tonnes
MYMV	: <i>Mungbean yellow mosaic virus</i>
NCBI	: National Centre for Biotechnology Information
ng	: Nanogram

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OD <sub>600</sub>	:	Optical density at 600 nm
PCR	:	Polymerase chain reaction
PPV and FRA	:	Protection of Plant Varieties and Farmers' Rights Authority, India
PVP	:	Poly vinyl pyrrolidone
QTL	:	Quantitative trait loci
RAPD	:	Random Amplified DNA
RB	:	Resistant Bulk
RFLP	:	Restriction Fragment Length Polymorphism
RH	:	Relative humidity
RIL	:	Recombinant Inbred Lines
rpm	:	Revolutions per minute
s	:	Seconds
SB	:	Susceptible Bulk
SNP	:	Single nucleotide polymorphism
SSR	:	Simple Sequence Repeats
TBE	:	Tris-borate EDTA
TE	:	Tris-EDTA
Temp.	:	Temperature
Tris-HCl	:	Tris- hydrogen chloride
V	:	Volts
VBN	:	Vamban
VRM	:	Virunchipuram
μg	:	microgram
μl	:	microlitre
μm	:	micrometre
%	:	percentage
°C	:	degree celsius
♀	:	Female
♂	:	Male

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## Definition of Some Terms Used in the present Study

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Ablation	: Surgical removal of body tissue or body parts
Adult bruchid emergence	: Insect progeny or subsequent progenies that emerged from the seeds after the release in laboratory
Antennae	: A long, thin sensory appendage found in pairs on the heads of insects and some other arthropods
Antibiosis	: Mechanism by which a colonised host is resistant, because it has an adverse effect on insect's development, reproduction and survival
Antixenosis (non-preference)	: It is used to denote the group of plant characters and insect responses that keep away an insect from using a particular plant (or) variety, for oviposition, food (or) shelter (or) combination of the three.
Aqueous extract	: Preparation containing the active ingredient of a substance in water
Artificial infestation	: Deliberate release of insects or organisms on different samples for the measurement or determination of resistance or susceptibility level.
Association mapping	: Linkage disequilibrium mapping; A method of mapping QTL(s) or markers that has the potential of genetically identifying significant associations/correlations between phenotypes and the underlying sequence variations.
Bioassay	: Measurement of the potency or effect of a substance (organism) by its effect on another organism
Bionomics	: Study of the behaviour and adaptation of organisms in their natural habitat
Biophysical	: Physical (outer) or morphological appearance of a biological organism
Botanicals	: Compounds obtained from plants and used as additives
Bruchidae	: Family of seed eating beetles, especially bruchids (eg. <i>Callosobruchus</i> spp.)
Bulked Segregant Analysis (BSA)	: Technique used to identify genetic markers associated with a mutant phenotype. This allows geneticists to discover genes conferring disease/insect/abiotic resistance or susceptibility. Technique involves forming two groups that display opposing phenotypes for a trait of interest
Candidate gene	: DNA sequence in a chromosomal region suspected of being involved in a particular trait of interest, e.g. disease or insect resistance
Coleoptera	: Largest order of phylum Insecta; including the seed beetles (bruchids)
Completely randomized design	: CRD; It is probably the simplest experimental design, in terms of data analysis and convenience. With this design, subjects are randomly assigned to treatments.
Cotyledon	: Embryonic part in seed bearing plants, one or more of which are the first leaves to appear from a germinating seed / portion enclosed within the seed coat
Decortication	: Removal of coat / testa (outer layer) from seeds
Ecdysis	: Process of emergence of a larva from an egg or an adult from a pupa
Exit holes	: Holes or hollowed window on seeds created by the emerging bruchid adults
Fecundity	: Reproductive potential of an insect characterized by egg-laying (oviposition) capacity
Free-choice test	: Grains are evaluated in a non-restricted environment where insects have the liberty to choose their preferred host, either for oviposition or feeding

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Bruchid generation	: 1-3 day old bruchid populations reared for successive generations (that were used for different experiments)
F <sub>9</sub> generation seeds	: Seeds advanced up to F <sub>9</sub> plant populations through single seed descent method
GBS	: Genotyping-by-sequencing – method to discover SNP (single nucleotide polymorphism) in order to perform genotyping studies such as genome-wide association studies (GWAS)
GC-MS	: Gas chromatography-Mass spectrometry – Instrument use for identification of biochemical compounds from a biological matter or substance ()
Hatching percent	: Percentage of eggs hatched out of the total number of eggs laid
Howe's Index or Index of Suitability	: Defined as the sum of stages attained by the individual insect under experimental conditions divided by the sum of the highest stages that would be reached in a controlled population.
Host plant resistance (HPR)	: Relative amount of heritable quality possessed by a plant which influences the ultimate degree of damage done by the insect (R.H. Painter, 1968).
Improved varieties	: Varieties that were developed and released for commercial production
Incubation period	: Time taken for egg hatching; time interval between eggs and first larval penetration
Incubator	: Enclosed apparatus / instrument providing a controlled and protective environment used to hatch eggs; culture insects or grow micro-organisms
Innovative	: Make changes in something already existing as by introducing new methods, ideas or products
Landraces	: Mixture of crop varieties that are farmer-selected and are highly adapted to local environmental conditions
Linkage map	: Linkage map is a linear order and positions of genes or loci along the chromosomes, which are useful for identifying the location and number of chromosome regions conditioning traits of interest
Longevity	: Survival ability of the insects (in days) from first day of emergence
Mapping	: Methods used to identify the locus of a gene and the distances between the genes; determining the order of or relative distance between genetic markers
Mapping populations	: Mapping populations are usually obtained from controlled crosses between two or sometimes more parents. The decisions on the selection of parents and mating design used for the development of a mapping population depend mainly on the objectives of the study. F <sub>2</sub> , backcross (BC), and recombinant inbred lines (RILs) are the three primary types of mapping populations used for molecular mapping
Mean developmental period (MDP)	: Number of days from 5 <sup>th</sup> day of oviposition to 50% emergence of insect progenies; in case of storage insects like bruchids
Mortality	: Number of deaths in a given area or period or from a particular cause (eg. number of deaths of bruchid adults)
Microsatellites or SSRs	: Specific short DNA sequences that are amplified by PCR containing short tandem repeat sequences of mono-, di-, or tetra-nucleotide motifs; co-dominant nature, high abundance and polymorphism

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No-choice test	: Grains are evaluated in a closed ventilated container (glass, jars, bottles) and artificially infested with bruchid insects for resistance determination
Oviposition	: Act of laying eggs, especially by means of an ovipositor in most insects
Pedigree	: Two founding parents used while crossing
Phenotyping	: Observable physical or biochemical characteristics of an organism, as determined by both genetic makeup and environmental influences. Or phenotyping refers to a quantitative description of the anatomical, ontogenetical, physiological and biochemical properties of an object
Physical map	: Arrangement of genes and DNA markers on a chromosome, which is based on the actual number of nucleotide pairs between loci, rather than recombination frequencies
Primers	: Short strand of DNA (generally about 18-22 bases) that serves as a starting point for DNA synthesis. It is required for DNA replication because the enzymes that catalyze this process, DNA polymerases, can only add new nucleotides to an existing strand of DNA
Pristine seeds	: Fresh seeds devoid of any bruchid eggs
QTLs	: Quantitative trait loci – section of DNA (the locus) which correlates with variation in a phenotype (quantitative trait); usually QTL is linked to or contains the genes controlling the phenotype
Quantitative traits	: Characters that show continuous phenotypic variation and are determined by the segregation of multiple loci
Recombinant Inbred Lines (RILs)	: RIL or single seed descent population is produced by repeatedly self-pollinating individual progenies of an F <sub>2</sub> population
Resistance	: Resistant sample is one which has the ability to be unaffected (or minimally affected) by insect damage or disease
Retention time	: Measure of the time taken for a solute to pass through a chromatography column. It is calculated as the time from injection to detection.
Seed coat or testa	: Protective outer covering of a seed
Skew	: Bias towards one particular group or subject
SNPs	: Single nucleotide polymorphisms – variation in a single nucleotide that occurs at a specific position in the chromosome; most common type of genetic variation among eukaryotic organisms
Survival per cent or emergence %	: Percentage of progenies capable of emerging as adults from the total number of eggs being laid
Susceptible	: Susceptible sample is one which is at the risk of becoming infested by an insect or infected by a disease
Symmetry	: Quality of being made up of exactly similar parts facing each other or around an axis
Tolerance	: Basis of resistance, in which plants show the ability to grow and reproduce itself / repair injury to a market degree in spite of supporting population approximately equal to a susceptible host
Vernier calipers	: Instrument for measuring external or internal dimensions, typically with two hinged legs and in-turned or out-turned points

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