Genetic Study of Pod Shattering Resistance in Soybean (*Glycine max* (L.) Merrill) Plant Populations Derived from Exotic x Local Germplasm

By

Nevhudzholi Khuliso Marline

Student Number: 11629675

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Department of Plant Production

School of Agriculture

University of Venda

South Africa

Supervisor: Prof. E.T. Gwata

Co-supervisor: Prof. G.R.A. Mchau

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Abstract

Soybean (*Glycine max* (L.) Merrill) is an important legume crop which is cultivated in many countries in the world. It is used for both human consumption and animal feed. In addition, it can be processed into several industrial products such as lubricants and biodiesel. The soybean plant contributes to soil fertility through biological nitrogen fixation. However, the production of soybean is limited by several abiotic stresses including pod shattering which can cause up to 90.0% yield loss. The trait also limits mechanical harvesting as the impact of machines on the canopy results in seed loss. Tropical soybean types which are compatible with indigenous soil rhizobia ubiquitous in African soils, are generally susceptible to pod shattering thus limiting their adoption by growers. The tropical types are desirable in soybean production systems which are limited by inorganic nitrogenous (chemical) fertilizers. Therefore the objectives of this study were to (i) widen the genetic pool for resistance to pod shattering using the cross between resistant x susceptible soybean germplasm (ii) determine the mode of inheritance for resistance to pod shattering in F_2 soybean plant populations segregating for pod shattering and (iii) determine the broad sense heritability for resistance to pod shattering in the soybean germplasm. The new information regarding the genetics of the trait would be useful in designing efficient genetic improvement programs aimed at introgressing resistance to pod shattering into tropical germplsm. Two crosses between distinct parental lines of susceptible tropical (TGx-14) and non-tropical resistant types (LS-82 and PAN-637) were performed in order to generate F_2 progenies that were subsequently evaluated for pod shattering using the field screening and oven methods. Six quantitative traits that are associated with pod shattering including the number of branches (NB), pod clearance (PCL) and pod length (PL) were measured in the F_2 segregating populations. At maturity, the proportion of shattered pods and duration to first pod shattering (DFPS) per genotype were measured. The traits associated with pod shattering showed wide phenotypic variability. In the cross LS-82 x TGx-14, the mean PCL was <20% of the mean plant height. The plant populations from both crosses developed short pods (<5.0 cm) but the cross involving TGx-14 x PAN-637 showed a marked superiority over the cross LS-82 x TGx-14 in a number of the traits associated with pod shattering. There were marked differences between the NB and