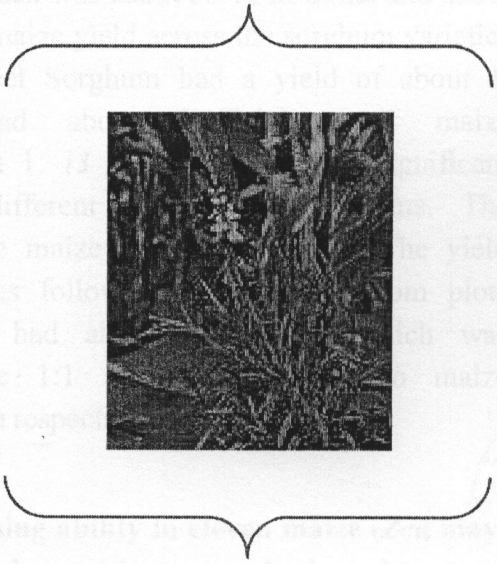
1.1.11 Rwiza, Ignath H. (2007). Combining ability for yield of Imidazolinone resistant maize (*Zea mays* L.) inbred lines under artificial and natural striga (*Striga hermonthica* (Del.) Beth) infestation. (Supervisors: Dr. M. Mwala and Dr. K. Munyinda).

Striga hermonthica (Del.) Beth popularly known as witchweed infests cereal crops particularly maize (*Zea mays* L.) leading to severe reductions in yields, thereby compounding the food insecurity of thousands of households in the sub-Saharan Africa region. In Tanzania, maize is grown on about 2 million hectares but the yields obtained are very low. It is estimated at 1.3 tons ha^{-1}. Various control measures against striga that have been used so far are not effective because the damage occurs before the weed emerges; therefore, an appropriate control strategy has to be effective in the soil before emergence. One promising strategy in suppressing striga parasitism has been the use of imidazolinone resistant maize varieties where the seed is coated with imazapyr herbicide. A study was carried out to investigate the inheritance of this trait in maize populations. Ninety three testcrosses based on three testers; CML373- IRlCML393-IR (tester A), CML202-IRlCML395-IR (tester B) and IR OPV(Synthesis 2000-IR) (tester C) were evaluated under natural and artificial striga infestation conditions in the Lake zone of Tanzania and Kisumu-Kenya in the 2006 season using alpha (0,1) lattice design. Grain yield was used as a proxy to maize resistance to imazapyr herbicide such that resistant materials were suitable candidates in striga infested areas with the use of the herbicide. The results from the study showed differences in both General Combining Ability (GCA) and Specific Combining Ability (SCA) effects for grain yield. GCA effects ranged from -0.57 to 0.78. SCA effects were different within each tester. The SCA effects with tester A, ranged from - 0.67 to 0.58, with tester B from -0.70 to 0.32 and with tester C from -0.62 to 0.80. The contribution of GCA and SCA to entry sums of squares for grain yield was relatively higher for GCA than for SCA at 38 and 32 percent, respectively. This suggested that the additive gene effects were the more important source of variation on herbicide resistance.