


1.4.2  Mutale, Chrysanthus. (2010). Adaptability of rice (*Oryza Sativa* L.) cultivars to different ecologies in Western Province of Zambia (Supervisor: Dr D. M. Lungu).

There has been a high demand in Western Province and Zambia in general to have superior rice varieties currently grown under flood plains to be produced in different ecological zones. Most of the currently available varieties were bred for lowlands and also production does not meet the country's demand as access to floodplains is limited. Cultivars could be indentified to be used in breeding programmes in order to come up with lines of wider adaptability to increase production and minimize imports and contribute to food security of the country. A study was carried out in Mongu and Kaoma with two sites each to evaluate the performance of rice cultivars under rain-fed upland and lowland ecologies and to identify the rice cultivar(s) appropriate for upland and lowland rain-fed conditions. The experiment was arranged in a Randomized Complete Block Design (RCBD) with four replications at all the four sites. Fifteen rice cultivars were tested for adaptability to the two ecologies namely Supa, Burma, Sumbawanga, Giza, Kajakete, Angola 1, Malawifaya, IITA, Burma 2, Wahi wahi, Xiangzhou 5, Koshi hikari, Black rice, NERICA 1 and NERICA 4. The two NERICA varieties are adapted to upland conditions in West and East Africa. Data collected included yield per hectare, number of tillers per stand, number of productive tillers per stand, plant height days to 50% and 100% maturity, number of spikelets per panicle, flag leaf area and 1,000 grain weight. Data was then analysed using the GENSTAT Statistical Package. Intra site and, combined analysis of variance, orthogonal contrasts, simple correlation analysis and Additive Main effects and Multiplicative Interaction (AMMI) Analysis for stability was carried out. The results revealed that yields were significantly different ( $P < 0.05$ ) from one site to the other. There was also significant Genotype x Environment Interactions for yield. In other words, genotypes performed differently from lowland to upland ecologies ( $P < 0.05$ ). Under lowland, for both Longe TAS and Namushakende TAS, high yields were recorded in Supa (3244, 4502 kg/ha), Wahi wahi (2780, 3100 kg/ha), Kajakete (2688, 3997 kg/ha) and Black rice (2703, 3086 kg/ha) respectively while under upland condition for both Namushakende TAS and Longe TAS, high yields were recorded in NERICA 4 (3124, 1900 kg/ha), NERICA 1 (2945, 2100kg/ha), Koshi hikari (2932, 1602 kg/ha) and IITA (2710, 1402 kg/ha), respectively. It was also found that the treatments were significant for number of tillers, number of productive tillers, number of spikelets per panicle, and days to maturity ( $P < 0.05$ ) in all the analyses and positively influenced the performances of the cultivars in the study. In conclusion, yield component traits such as number of tillers, number of productive tillers, and number of spikelets per panicle, including the phenological trait; days to maturity can be used as indirect selection criteria for developing superior cultivars adapted to upland cultivation. This study has shown that, NERICA 1, NERICA 4, Koshi hikari, IITA and Xiangzhou 5 could be considered for selection as lines that could be used in breeding programmes aimed at developing varieties for upland rain-fed cultivation.