2.4.1 Swai Adam M. N. (1996). Effects of spacing, row arrangement and genotype on grain yield of pigeon pea (*Cajanus* cajan (L.) Millsp.) intercropped with sorghum (Sorghum bicolor L. Moench). (Supervisors: Dr. M. S. Mwala, Dr. J. M. Mulila-Mitti and Dr. D. M. N. Mbewe).

An experiment was conducted at UNZA and ZAMSEED farms in Lusaka during the 1994/95 season to study the effects of spacing, row arrangement and genotype on the grain yield of Pigeonpea (*Cajanus cajan* (L.) Millsp) intercropped with Sorghum (Sorghum bicolor). A split-split plot design was used with genotypes [Short Duration (SD) and Medium Duration (MD)] as sub-subplots, spacings (70 cm x 30cm; 60 cm x 40 cm; 50 cm x 50 cm) as the sub-plot and the row arrangements (1:1 and 2:1) as main plots. Sorghum (kuyuma cv.) was planted in single and double rows 20 cm apart and the within row spacing of 50 cm. Recommended basal fertilizer application of 30 kg N ha^{-1} and 8 kg P ha^{-1} were applied by broadcasting at planting. Other husbandry practices were also timely ensured. Due to prolonged terminal moisture stress which coincided with flowering stage the medium duration genotype failed to produce grains and were therefore omitted in the results. Increased spacing led to a decline (r= -0.487) in the grain yield of pigeon pea but had no effect (r= 0.196) on grain yield of sorghum. The 70 cm x 30 cm spacing gave the highest overall productivity (LER = 1.4).The combination of 1:1 row arrangement and a spacing of 70 cm x 30 cm gave the highest grain yield (519 kg ha^{-1}) of pigeon pea in contrast to the combination of 2:1 row arrangement and a spacing of 50 cm x 50 cm that gave the highest yield (4,667 kg ha-1) of sorghum. The best combination of row arrangement and spacing was 1: 1 and 60 cm x 40 cm which gave an overall productivity of LER = 1.85. The fact that all the intercrop treatments had relatively higher LER (1.07 - 1.85), signify that pigeon pea/sorghum intercropping was more advantageous than monocropping of either of the two crops. On average, the pigeon pea/sorghum intercropping system provided 103% of the equivalent yield of sorghum and 43% of the sole pigeon pea. Effects of row arrangement of yield components of pigeon pea revealed that the control gave the highest branches/plant (15) while 2:1 produced the highest number of seeds/plant (174). The control also gave the highest 100 seed weight (15.1 g). For sorghum the 1:1 row arrangement gave the highest 100 seed weight (4. 8 g). There was no significance difference among the row arrangements nor among the spacings for pigeon pea

height. However, the change in spacing had a significant ($P \leq 0.05$) effect on the height of sorghum at 6 weeks after emergence (WAE). Tallest plants for pigeon pea and sorghum (124.2 cm and 173.6 cm respectively) were observed in the 2: 1 arrangement and 60 cm x 40 cm spacing. Based on the results, it was concluded that 1:1 arrangement and 70 cm x 30 cm spacing were the most suitable combination for higher yield of pigeon pea. On the other hand, the 2: 1 row arrangement and 50 cm x 50 cm spacing were the most suitable combination for increased yield of sorghum. In an intercrop the best combination for increased productivity was 1:1 row arrangement and 60 cm x 40 cm spacing. No inference could be drawn on the effect of genotype on the grain yield of the intercrop.