

### 7.1.1.2



Zishiri, Chipo. (2000). Effects of different tillage systems on growth and yield of tomato (*Lycopersicon esculentus* Mill.). (Supervisor: Dr. D. M. N. Mbewe).

Tomato production among the subsistence farmers virtually stops during the rainy season and is low during the dry season. Field trials were carried out during the rainy and dry season. Field trials were carried out during the rainy and dry seasons at Zamseed Farm in Lusaka Zambia to determine the effects of different tillage systems on growth and yield to tomato. The rainy season trial was conducted from January to May 1999 while the irrigated trial was done from June to October 1999. The tillage systems used were furrow, ridge planted on the side, ridge planted on top, raised bed and flat seedbed (control). For each season, treatments were arranged in a Randomized Complete Block Design with four replications. Parameters measured were seedling mortality, plant height, lateral branches, and days to 50% flowering and fruiting, fruit size, diseased fruits, moisture content and yield of tomato. Plant height was significantly ( $P < 0.01$ ) higher in raised beds and ridge bed and ridge planted on top treatments i.e. 81.4cm and 73.8cm respectively across seasons. The shortest plants were in the flat seedbed, ridge planted on side and the furrow tillage systems. The raised bed and the ridge planted on top treatments also led to delayed maturity at 50 and 49 days, respectively while they increased lateral branches to 17 and 15, respectively, and produced smaller fruit sizes. Seedling mortality in these treatments was reduced from 13,388 in furrow to 1,388 and 4,166, respectively. Similarly, diseased fruits per ha reduced from 5,972 in furrow to 24,305 and 17,361, respectively. The flat seedbed, ridge planted on side and furrow treatments led to earliest maturity averaging 42 days, the same treatments reduced the number of lateral branches, increased the average seedling mortality and diseased fruits (8,861 and 59,490), respectively. However, the largest fruit size was obtained from the ridge planted on the side (60mm). Tomato yield was significantly ( $P < 0.01$ ) higher in raised beds (50.6t/ha), followed by the ridge planted on top (41 t/ha), furrow (37.6t/ha), ridge planted on the side (36.9t/ha) and flat seedbed, the control (35.8 t/ha). In addition, the rainy season recorded lower average yield (14.3t/ha) compared to under irrigation (66.6t/ha). Total yield for combined analysis was positively and significantly correlated ( $r = 0.74^*$ ) with plant height. Plant height was also positively and significantly correlated ( $r = 0.67^*$ ) with lateral branches. The study showed that different tillage systems have profound effects on the tomato plant performance, with the ridge planted on top and raised bed giving the highest yields; while the largest fruits were obtained in all treatments except the furrow. Differential tillage systems responses observed for some of the measured characters between the rainy and irrigated seasons did not translate in any effect on final yield. The best yields were during the irrigated season regardless of the tillage system used. Economic returns were highest during the rainy season as supply decreased and prices increased. During the same season, gross margins were highest on raised bed and ridge

planted on top tillage systems, with K11,498,796 and K7,693,187 returns, respectively. However, the raised bed tillage systems used the highest labour cost.