

1.2.2 Ntlou Napo K. E. (2000). Effects of watering interval, planting depth and soil crusting on emergence and seedling establishment of sorghum (*Sorghum bicolor* (L.) Moench.). (Supervisors: Dr. O. M. Lungu and Mr. V. Shitumbanuma).

A study was conducted in the glasshouse to investigate the effects of soil type, watering interval, planting depth, and crust formation on emergence and seedling establishment of sorghum. Three separate pot experiments were conducted using three soil types and sorghum as a test crop. Various treatment combinations of soil type/watering interval, soil type/planting depth and soil type/water drop size delivered from a rainfall simulator were evaluated. Following the addition of water through the rainfall simulator, soil samples were prepared into thin sections that were examined under a microscope to determine the impact of water drops on the soil. Sorghum emergence, shoot height and shoot dry matter, and crust strengths of the soils were measured. Sorghum emergence was measured for 15 days while shoot height and shoot dry weight were measured at 28 days after planting. Watering intervals had no significant effect on seedling emergence. Increasing watering interval from 2 days to 8 days reduced shoot height and shoot dry weight on all three soils. Shoot height and shoot dry weight from clay loam soil was significantly ($P \leq 0.01$) higher than from both the sand soil and the sandy loam soil. The effect of planting depth on seedling emergence was highly significant ($P \leq 0.01$). The seedling emergence percentage at 15 days after planting (DAP) was significantly higher at the shallower planting depth of 3 cm (98%) than at the depths of 6 cm (64%) and 9 cm (13%). Shoot height and shoot dry mass were significantly ($P \leq 0.01$) reduced when seeds were planted any deeper than 3 cm. The effect of crusting on emergence and seedling establishment varied significantly ($P \leq 0.01$) with soil type. Seedling emergence was 83% from sandy loam, 81 % in sand and with the least from clay loam (52%) at 15 DAP. The crust strength varied with soil type, clay loam (3.5 kq/cm^2), sandy loam (1.54 kq/cm^2) and sand (0.9 kq/cm^2). The crust strength was negatively and significantly ($P \leq 0.01$) correlated with seedling emergence ($r = -0.61 **$), shoot height ($r = -0.72 **$), and shoot dry weight ($r = -0.61 **$) across soil types. Microscopic examinations of soil thin sections revealed that soil crusts in clay loam and sand were thicker (1 mm) than in sandy loam (0.2 mm). This investigation has shown that planting shallower (3 cm) and avoiding soil crusting especially in clay loam can lead to improved sorghum emergence and better stand in the field.