

Case study 1. Rehabilitation of degraded soils by triggering soil invertebrate activities in Africa

In the Sahel, the “zaï” is a traditional soil and water conservation (SWC) technique developed in the semi-arid lands (yearly average rainfall < 600 mm) in northern Burkina Faso (Yatenga Province) where the soils are heavily encrusted. The zaï is usually a hole or basin with a diameter of 20–30 cm and depth of 10–15 cm set at intervals of 1–5 m, with between 12 000 and 15 000 holes per hectare; part of the soil that has been removed is combined with organic matter and put back into the hole. The holes are above all used to rehabilitate the lateritic and sandy-clay soils that the Mossi call “zippelle” (“clearing” or “bare soil”) and are dug during the dry season (November to May). Subsequently, seeds of crops or whole crop plants are placed in the zaï. The incorporation of organic matter increases the nutrient status of the soil. Runoff from the crusted soils will tend to infiltrate into the depressions which consequently become microsites of greater soil water content.

During the dry season the zaïs collect the leaves, twigs and fine sand carried by the wind. In addition, organic mulch is placed in the holes by farmers in order to trigger termite activity; the termites dig underground galleries that facilitate the deep infiltration of rainwater and runoff. Termites improve the structure of crusted soils by reducing soil compaction, increasing soil porosity and improving water infiltration. A study showed that this termite disturbance resulted in a viable management option and improved growth and yield of crops. Yields reached one tonne per hectare where cow manure had been added and termites were present.

Another agricultural technique used in a number of tropical countries in Africa to ameliorate soil conditions for crops is “ecobuage”. This is a traditional complex agricultural system, more evolved than the slash-and-burn technique, that entails incinerating herbaceous vegetation piled up in mounds and buried under a layer of soil taken from the surroundings. The technique supplies the soil with mineral nutrients through slashes, and increases soil pH. In a study conducted in Bouenza (Congo), the use of “maalas” (ecobuage) increased soil invertebrate communities, especially earthworms, which led to improved soil structural stability, creating good conditions for plant root development.

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