



The Zainer

A simple machine to support climate resilient agriculture

Zainer

Prolonged dry spells during the rainy season pose serious risk to food security for farmers in Africa. Conservation and regenerative agriculture can mitigate this risk, but farmers consider it as too labor-intensive. PRACTICA therefore initiated the development of a simple tool to quickly and cheaply produce small basins or pits to improve soil moisture retention as well as soil regeneration. We call this tool the Zainer, as a reference to the traditional West African practice of producing small potholes, called Zai.

Technical design

General characteristics

The Zainer is a vertical drill, mounted on a two wheeled cart and operated by a small 5hp petrol engine. The drill bit can easily be replaced and be adapted to different soil conditions and desired hole dimensions. A provision can be added to set different line and hole spacing as required.

Accessibility to women

This tool is accessible to women. Not too heavy to handle, it also saves time for other daily tasks.



Different drill bits

Configurations

The present design is a complete machine including the engine. However, other configurations, such as the following options could be explored:

- Redesigning it a toolbar to be fitted, for instance, a two-wheel tractor. In that case, more power would be available and it may be possible to drill 2, 3 or even 4 holes at the same time.
- Redesigning it as a machine which operates on a solar engine.

Further field testing is required to validate these assumptions.

Speed of operation

During field tests in Burkina Faso (2022), farmers were able to produce an average of 17 Zai plantholes per minute. The required 15.000 plantholes per hectare will take 15 hours. To make Zai holes manually in Burkina Faso takes 300 hours/ha.

Soil deposition

The special shroud around the drill serves two purposes: 1) it protects against stones flying away and 2) it can deposit the soil, either on one side or another. With the latter, the shroud ensures that the soil is deposited downstream of the pit on a plot with a slope. This has the advantage that when it rains, the contour created around the lower part of the pit will guide the water into the pit. Organic or chemical fertilizer can be applied in the pits to stimulate crop growth even more.

Business case

Local production & capacity building

The Zainer is designed for local production. PRACTICA can assist in establishing necessary procurement channels and train enterprises interested in machine production. We can also facilitate the capacity building of other stakeholders, such as government institutes, maintenance technicians and end-users, and provide advisory services in sustainable land and water management practices.

Economics

The design of the Zainer is optimized for lowest build cost, resulting in a retail price within reach of smallholder farmer groups or cooperatives. Actual local price point will vary based on local production cost, transport cost and margins. For business case calculations we have calculated a retail price of under EUR1200.

The main component of the operational costs will comprise of fuel costs. The measured fuel consumption is 0,7 l/hr (10,5 l/ha). Other operational costs will include maintenance and depreciation and rental or operator costs.

Ownership & management

In case of smallholder farming, the ownership of the Zainer by a service provider or farmer cooperative is deemed the most logical option. In its present design form (a very simple and robust configuration), it may be feasible for farmers to rent the machine and operate it themselves.



Scan the QR code to see the Zainer in action



What is PRACTICA Foundation ?

PRACTICA is a non-profit organization. We work in over 10 countries to support our partners like NGO's, governments, local entrepreneurs and farmer organisations with technical know-how on small scale technologies in the field of water, agriculture and sanitation.

We are not an implementing organization, but guide and train partners in the use, uptake and knowledge of various technologies. Research and development is a core part of our work at our head office in the Netherlands where we develop & test new products that could improve the lives of the poor. As an example, we have developed one of the first solar pumps on the African market, which is now being marketed by one of our partners Futurepump.

Development stage - January 2023

PRACTICA has executed field surveys in Burkina Faso and Mauretania to understand the potential interest and willingness-to-pay among farmers. Based on these findings, proof-of-concept tests were conducted in 2021 in Burkina Faso with the first prototype.

In 2022, a farmer field pilot was conducted at three sites in Burkina Faso. Crop production was compared to fields prepared with manual Zai and to cropping without Zai. This test confirmed assumption on improved crop yield; the test plots showed and increased sorghum yield of 90% - 160% compared to the reference fields without Zai.

Farmer feedback on the operation of the Zainer has resulted in an improved design, of which 3 prototypes will be produced in Burkina Faso and tested by farmers at a larger scale in April - May 2023. Start of local production and marketing in Burkina Faso in planned for end of 2023.

