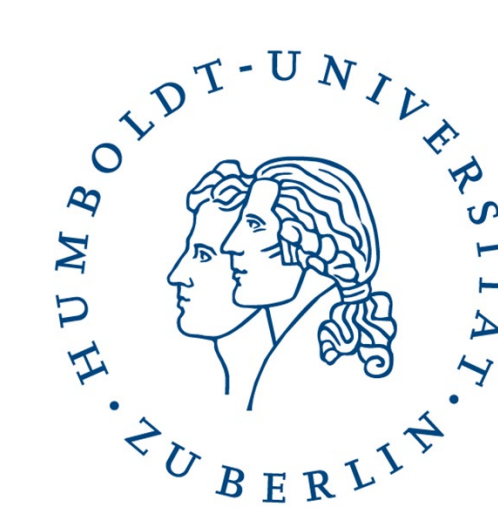




Transforming sorghum farming in semi-arid Burkina Faso through agroecological intensification



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Background

Sorghum (*Sorghum bicolor* (L.) Moench) is the most crucial staple crop for rural households in Burkina Faso.^{1,2}

The changing climate and declining soil fertility are reducing sorghum yields.¹

In the past, the average yield was 900 kg ha⁻¹, today yields are 100-400 kg ha⁻¹ with rare cases of 500-600 kg ha⁻¹.^{3,4}

Hunger remains a major problem, along with peace⁵, extreme weather (heat, drought, erratic rainfall) lack of access to income, high illiteracy and gender inequality.²

Methods

Inter-farm comparison trial on the Plateau-Central of Burkina Faso with four treatment plots of 10×10 metres (**as an adapted mother and baby trial design**⁶)

Treatment: Two-factorial trial (seed varieties and itinerary for agroecological intensification) each combined at two levels:

A. local sorghum seed (T1/T3) & Sorghum vr. Kapelga/Flagnon T2/T4
B. Agroecological intensification itinerary (T3/T4) & (farmer-style method) (T1/T2)

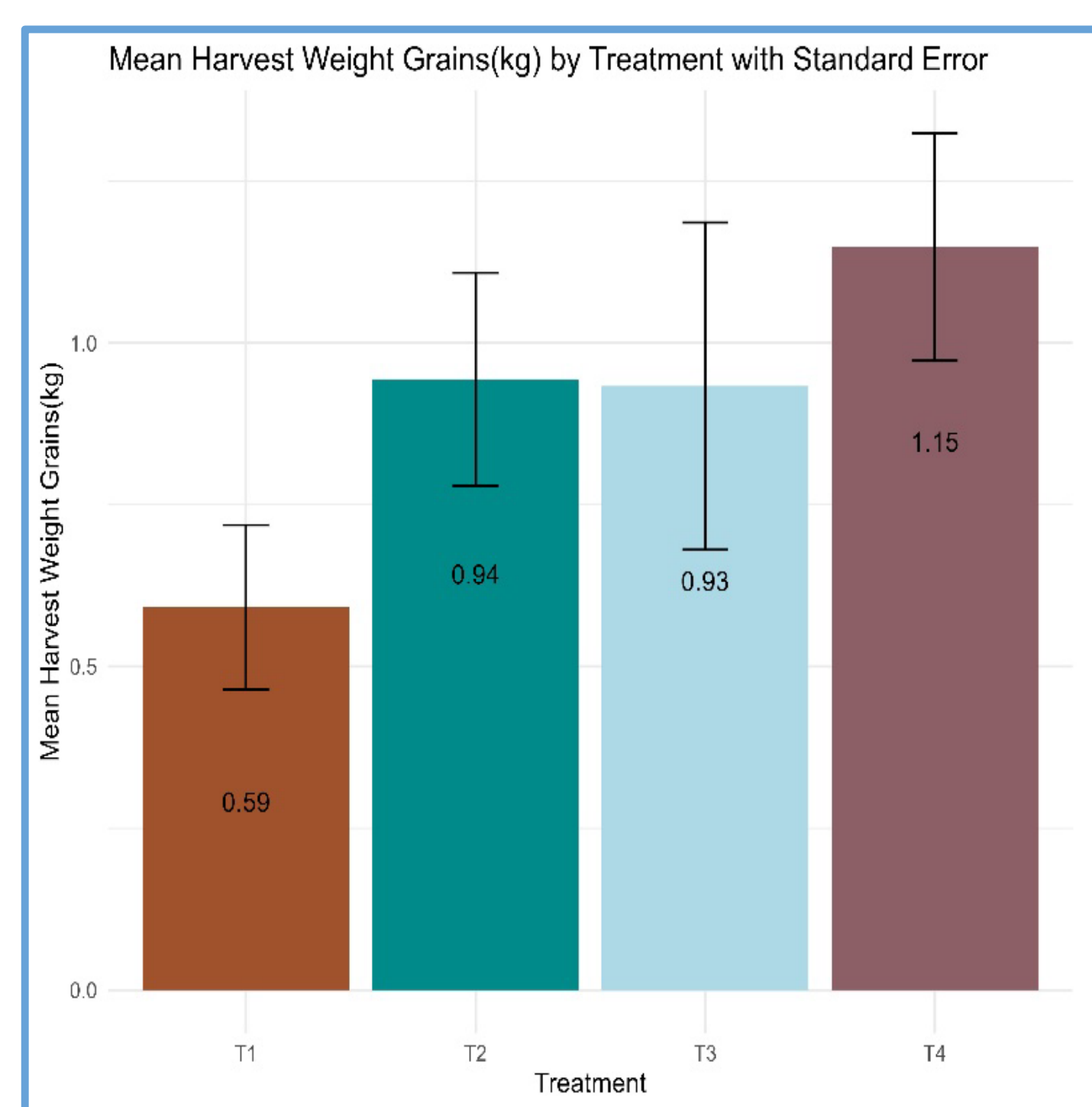
Itinerary for agroecological intensification: 1. Application of 2 t ha⁻¹ of composted manure, 2. Respecting the sowing date, 3. Number of seeds per hole, 4. Spacing, 5. Dethatching, 6. Regular weeding, 7. Ridging

Soil analysis: before planting and after harvest (organic matter, Corg, N,P,K, pH, texture)

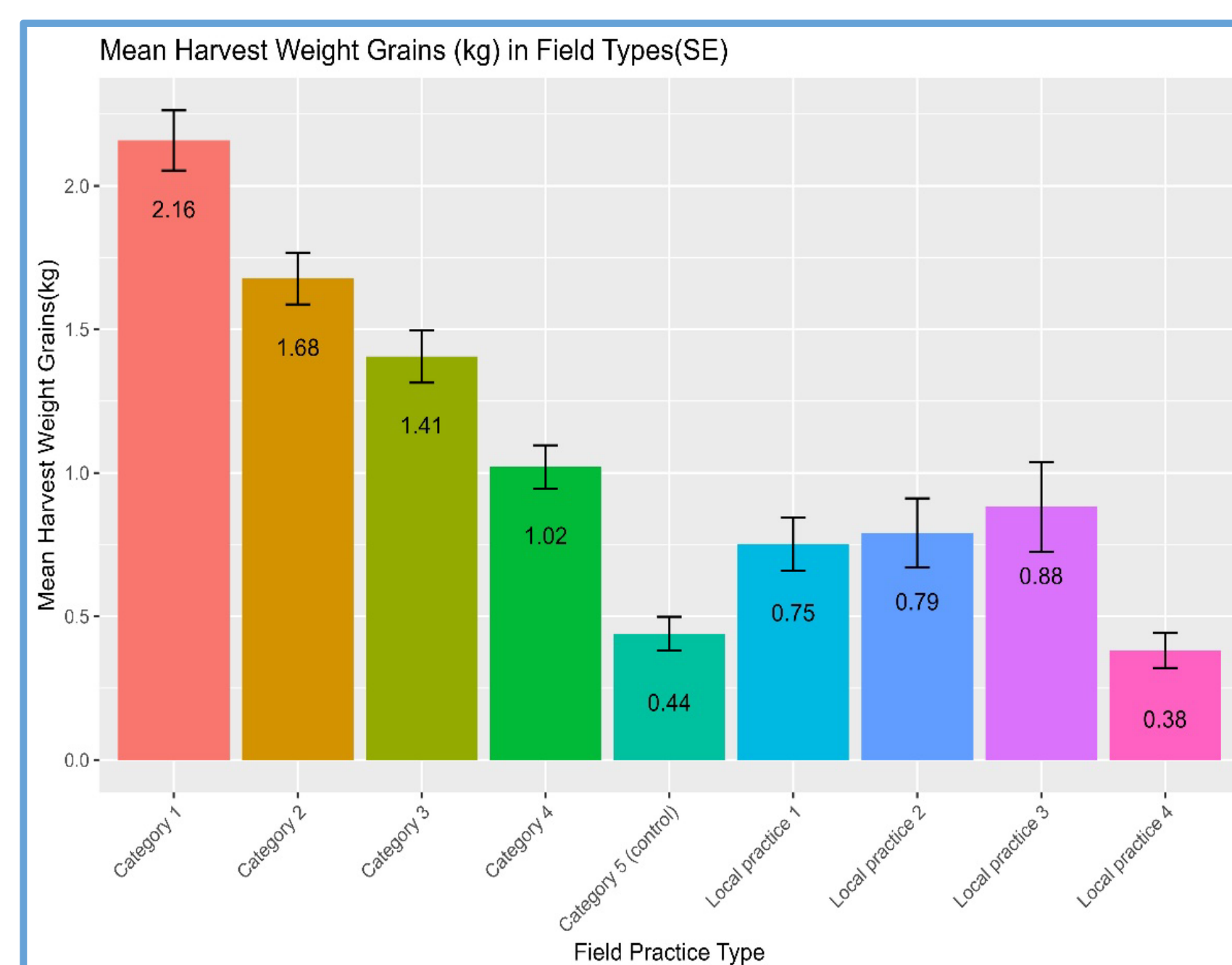
Farmer-led: Farmers were trained to implement the itinerary and to evaluate the harvests by measuring seven traits (number of plants, stem size, panicle length, panicle weight, 1000 grain weight, harvest weight of stem and grains). Almost all farmers established their own farmer-style copy fields of which 40 farmers were randomly selected to measure the productivity potentials (**baby trials**) including participatory yield assessments and video testimonies



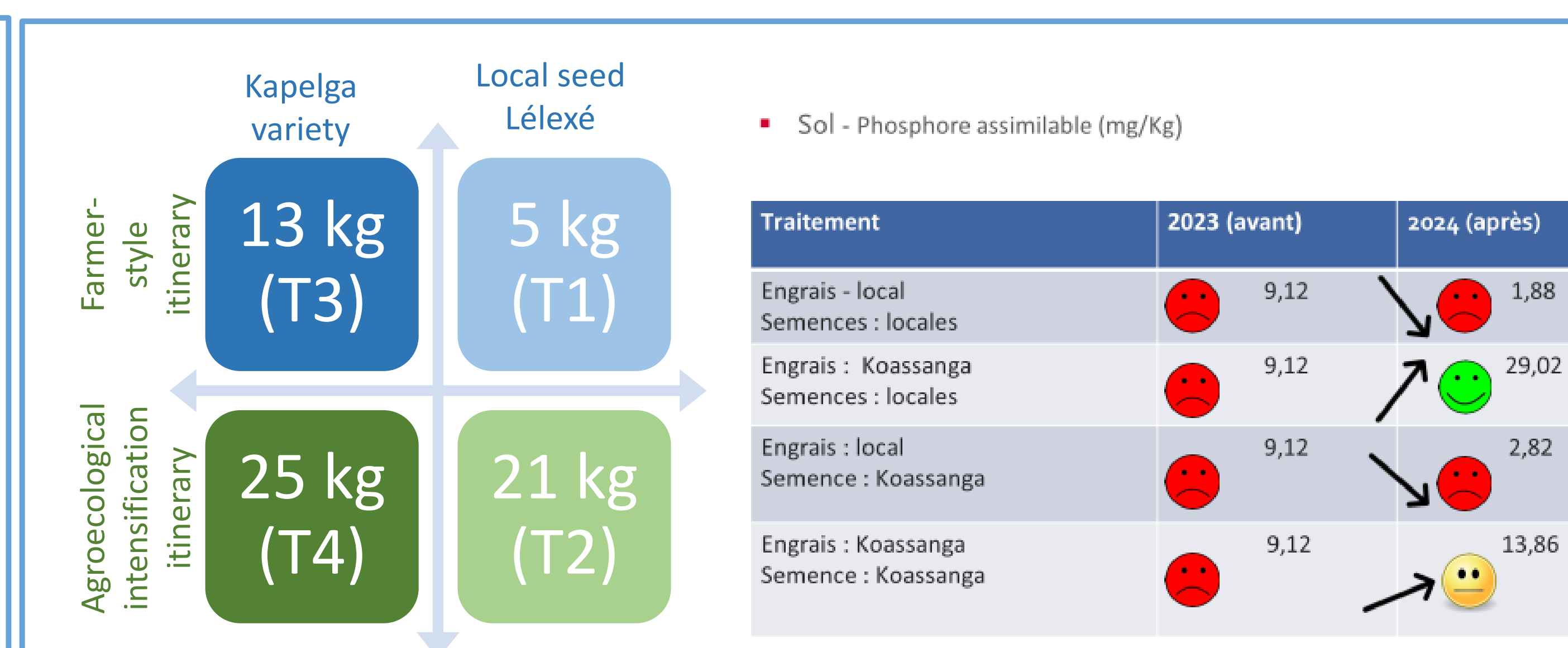
Results – Farmer-led agroecological intensification research



The statistical analysis included normal distribution check, Levene's homogeneity test, ANOVA and post-hoc tests. **The results show significant differences between treatments in all traits.**



The more steps of the agro-ecological intensification itinerary are followed, the higher the yield: Category 1 (~T4): minimum 6 practices, Category 2: 4-5 practices, Category 3: 3 practices, Category 4: 1 practice, control compared to local practice of respective farmers (~T1)



Scaling out and scaling deep in farming community: Feedback meetings between farmers, scientists and the NGO to discuss results in a farmer-friendly way. Results are presented village by village.

Left: The total yield per 100 m² plot increased in all villages using the improved agroecological intensification itinerary (here example of Lélexé village).

Right: P content of soil has been improved by adding 2 t ha⁻¹ of composted manure (here: Lélexé village).

Conclusion

The measurements (productivity parameter of 2 x 2 m) highly correlated with total harvest per plot. However, the **assessment method** (e.g. one panicle per plant) was **suboptimal**. In villages with better soil fertility, the seed and fertiliser effect was less visible compared to two villages with general lower soil fertility. In two villages with higher soil fertility, T4 yields tripled or increased fivefold compared to T1 (control). In plots with lower soil fertility, the control fields T1 suffered a total crop failure, while the P4 treatment yielded 800 to 1200 kg ha⁻¹. Here the fertiliser effect was even more pronounced. The **yield potential of 2.8 t ha⁻¹ for Kapelga seed was reached** in Andem under agroecological intensification treatment. **Dethatching** is a culturally **unfamiliar** practice, and farmers are reluctant to do it because of the **perceived negative impact** on crop yield. Farmers are aware of the need to **control weeds and Striga**, but the **lack of labour-saving technologies** makes this a difficult step. Ridging and timely sowing are agro-ecological intensification techniques that are easier to implement. This study highlights the **potential of the agroecological intensification itinerary to lift rural populations out of food insecurity in record time**. In all four villages farmers are eager to continue, so the trial will be repeated in 2024. However, **more systemic changes are needed for real transformation**.

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NUTRIGREEN

Promoting Green Nutrition for the Sahel region

NUTRIGREEN is an international project with partners in Burkina Faso, Germany, Senegal and Sweden. The project investigates the value chains of traditional African plants in order to strengthen their impact in the local and regional agri-food system. Together with farmers, consumers and other value chain stakeholders, we research their current status and future potentials from farm to fork in Living Labs.

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