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Intercropping chickpea and lentil with buckwheat: effect on weed suppression and legume yield (Poster #10)

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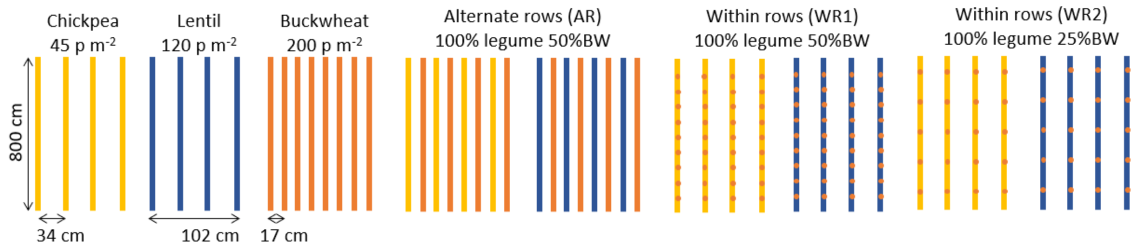

Figure 1. Spatial arrangements and plant densities of the three crops in pure stands and in intercropping

Intercropping provides benefits in terms of production gains and other ecosystem services. Although legume-cereal intercrops have received the most attention in literature, other species should be explored to increase the diversity of intercropping systems (Cheriere *et al.*, 2020). Including pseudo-cereals in cropping systems enriches biodiversity and lowers the environmental impact of arable crops as they are often adapted to grow in nutrient-poor soils (Manners *et al.* 2020). In a policy context of protein and agro-ecological transitions, it is necessary to increase legume production and consumption. Since legumes are known to be poor competitors towards weeds agroecological practices may help decrease weed pressure. Our objective is to study the effect of different intercropping arrangements of lentil (*Lens culinaris*, Medikus) and chickpea (*Cicer arietinum*, L.) with buckwheat (*Fagopyrum esculentum*, Moench) on weed suppression and potential legume yield improvement.

The field experiments were conducted at the experimental farm of the University of Udine (NE Italy) in 2023 and will be repeated in 2024 (expected harvest July 2024). Lentil (LN) and chickpea (CH) were intercropped with buckwheat (BW) in two spatial arrangements (Figure 1). Trials followed a completely randomized design with four replicates per treatment. Weeding was performed once by manual hoeing at the 5th leaf stage of the legumes (only in pure legumes, WR1 and WR2). A vegetation survey was performed before and after hoeing. In two quadrats (0.50m x 0.7m), randomly placed in each plot, we identified weed species and estimated plant cover of weeds and crops. At crop flowering and harvest, plant height of the legumes and BW was measured on five plants per plot. Aboveground biomass of LN, CH, BW and weeds was collected in one quadrat of $0.35m^2$, then oven-dried at 70°C for 72h. Crop grain yield was measured from a larger area (0.70m x 2m). Response variables were analyzed with a one-way anova. When treatment resulted significant, differences between means were assessed with a Tukey HSD test.

In both the CP and LN trials, weed biomass was significantly higher in the pure BW plots. No differences in weed biomass were found between the pure legume plots, AR and the WR plots in both trials. CH yield was lowest in AR (0.44 ± 0.12 t ha^{-1}) and highest (1.24 ± 0.18 t ha^{-1}) in the pure crop. LN yield was not affected by intercropping with BW.

Our results indicate that BW significantly affected CH yield only in the AR arrangement. Zhou *et al.* (2023) found similar results in CH intercropped in AR with flax. LN yield was not affected by the presence of BW. This is in contrast with the results of Wang *et al.* (2012), who recorded significant LN yield losses in a 3:1 ratio with BW. We expected good weed suppression by BW (Farooq *et al.*, 2016), but higher weed biomass was recorded in sole BW plots compared to others. BW stand density was affected by three light frosts within a few days of sowing. Perhaps a higher density of BW in the ongoing 2024 experiments could confirm findings from other intercropping studies, where a competitive effect of BW on weed species was documented (Cheriere *et al.*, 2020).

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