Management of Food Legume Pod borer and Aphids through Intercropping in Morocco

Rachid Boulamtat and Seid Ahmed

International Center for Agricultural Research in the Dry Areas (ICARDA), Station Exp. INRA-Quich, Rabat, Morocco.

Rational

Chickpea pod borer (*Helicoverpa armigera*) and green pea aphids (*Acyrthosiphon pisum*) are key production constraints of chickpea and lentil, respectively. Intercropping chickpea and Lentil with different crops are known to reduce the incidence of aphids and pod borers on lentil and chickpea crops. Coriander is one the most important income-generating crops and plays a role in providing ecological services including managing aphids and pod borers on food legumes in many countries (Lamichhane et al. 2015; Abd et al. 2020; Mena and Goospodarek, 2024). Coriander is produced widely by farmers as a cash crop and can be integrated in a cropping system to manage aphids and pod borers in temperate food legumes. The role of coriander intercropping with chickpea to manage pod borer of chickpea and food legume aphids was not explored under Moroccan cropping systems. The purpose of the study was to evaluate the impacts of coriander intercropping in reducing the negative impacts of pod borer and aphids on temperate food legumes

Methodology

The on-station research on intercropping for both crops and pests were done at ICARDA Research station, Merchouch in Morocco during the 2023/24 cropping season (Fig.1). For lentil-coriander intercropping, the lentil cv. *Bakria* was intercropped with coriander and the trial was arranged in a randomized complete block design with four replications. Four rows of coriander were planted between lentil plots. Sole lentil plots were used as checks. Five lentil plants were randomly selected from each plot and the number of aphids was counted.

Figure 1. Lentil and coriander crops in the 2023/24 cropping season, Merchouch, Morocco.

The chickpea intercropping trial was set up as a randomized complete block design with two planting dates (07 May and 24 May 2024). The Plot size was 3.6 m^2 with four rows of winter planted kabuli chickpea (cv. *Farihane*) and four rows of local coriander were planted between chickpea plots (Fig.2). The sole cropped chickpea was used as checks. Data on damaged pods were recorded from five random plants per plot at the full podding stage of chickpea.

Figure 2. Chickpea and coriander crops in the 2023/24 cropping season, Merchouch, Morocco.

Results

Effects of intercropping on green pea aphid: The green aphid population during the 2023/24 cropping season was within the ranges of the economic threshold (20 to 66 aphids per sweep). The aphid population was slightly reduced in lentil plots intercropped with coriander (Fig. 3.). The average number of aphids exceeded 50 in sole lentil plots compared with an average aphid population of 40 aphids/ five plants in intercropped lentil plots. Natural enemies were observed on the coriander plots than on the lentil plots (Fig.4)

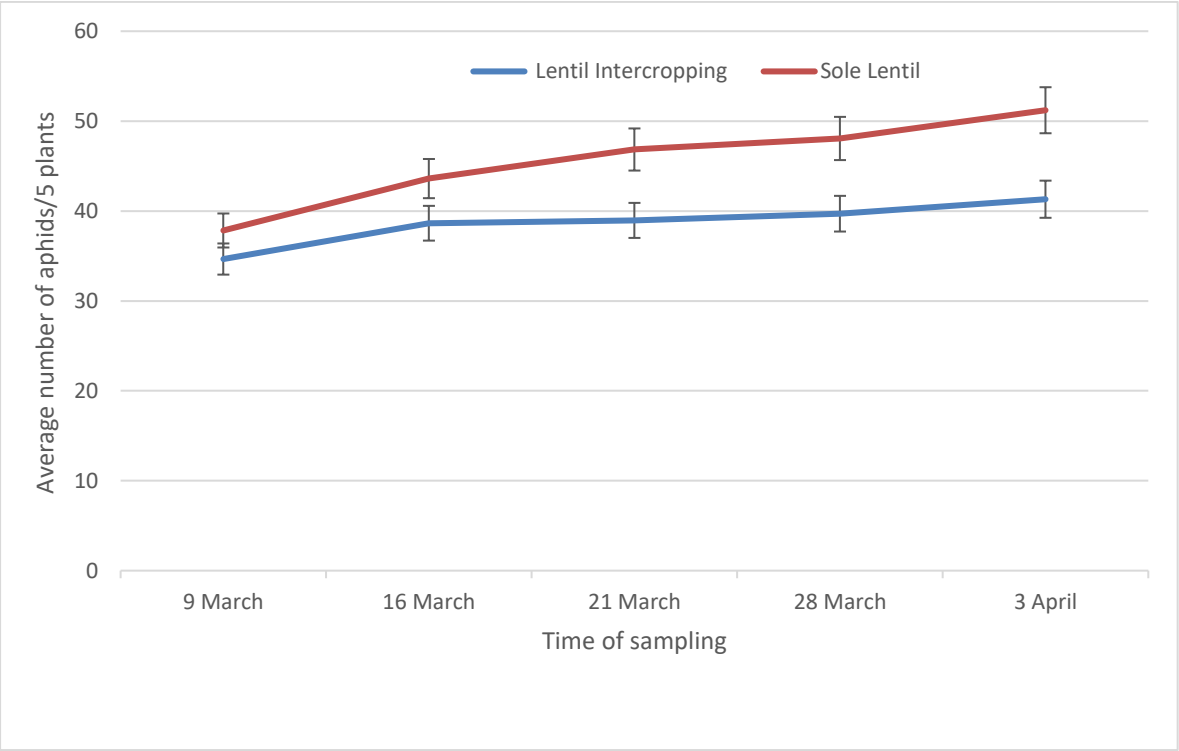

Figure 3. Average number aphid population in sole and intercropped lentil plots, 2023/24 cropping season, Merchouch, Morocco.

Figure 4. Naturel enemies attracted by Coriander in the 2023/24 cropping season, Merchouch, Morocco

Lentil-coriander intercropping resulted in a high yield compared to sole lentil plots. The average seed yield of lentil in the coriander intercrop plots was about 0.9 t/ha compared to 0.6 t/ha seed yield in sole cropping.

Intercropping on pod borer incidence and damages: During the cropping season the pod borer population was higher than the economic threshold of two larvae per m^2 (Singh et al, 2021). Sole chickpea experienced more pod damage than those intercropped with coriander. The average pod damage was 37% in sole cropped chickpea as compared to 30 % in the intercropped system (Fig.5).

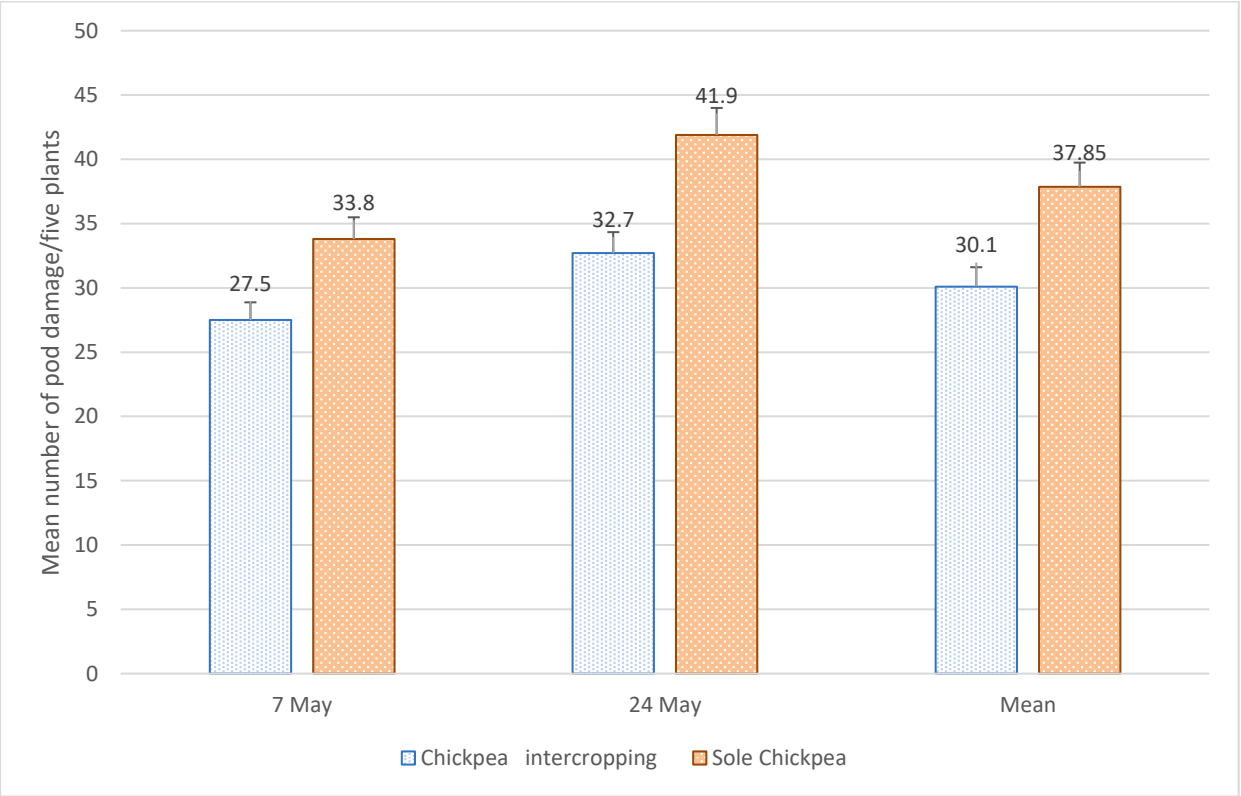

Figure 5. Mean number of pod damages on sole and intercropped chickpea plots, 2023/24 cropping season, Merchouch, Morocco

Intercropping with coriander gave a slight yield advantage over sole chickpea cultivation. The crop was affected by drought and the average productivity of intercropped chickpea (0.7t/ha) and sole cropping (0.6t/ha) was not different. Due to reduction in pod damages, intercropping can play roles in pest mange in chickpea crop.

Conclusion and recommendation

Intercropping lentil and chickpea with coriander resulted in reduced damage from aphids and pod borers and increased seed yields of both crops. Since coriander is already cultivated by farmers in Morocco, it can be easily integrated as a sustainable practice to reduce pest damage, enhance farm productivity, and minimize pesticide uses. This innovation will be demonstrated under farmer situation in 2024/25 cropping season.

References

Abad MKR, Fathi SAA, Nouri-Ganbalani G. et al. 2020. Influence of tomato/clover intercropping on the control of *Helicoverpa armigera* (Hübner). International Journal of Tropical Insect Science, 40, 39-48.

Lamichhane JR, Barzman M, Booij CJH, et al. 2015. Robust cropping systems to tackle pests under climate change: A review. Agronomy for Sustainable Development, 35, 443-459.

Mena, G. T. and Gospodarek , J. 2024. White Mustard, Sweet Alyssum, and Coriander as Insectary Plants in Agricultural Systems: Impacts on Ecosystem Services and Yield of Crops. Agriculture 14, 550; https://doi.org/10.3390/agriculture14040550

Singh, R, Taggar GK, Singla, et al. 2021. Computation of economic threshold and economic injury level of *Helicoverpa armigera* (Hubner) in chickpea. Journal of Entomological Research, 45, 696-701

FUNDING

This activity was supported by CGIAR Plant Health and Rapid Response to Protect Food Security and Livelihoods Initiative (Plant Health Initiative) through CGIAR Trust Fund.