

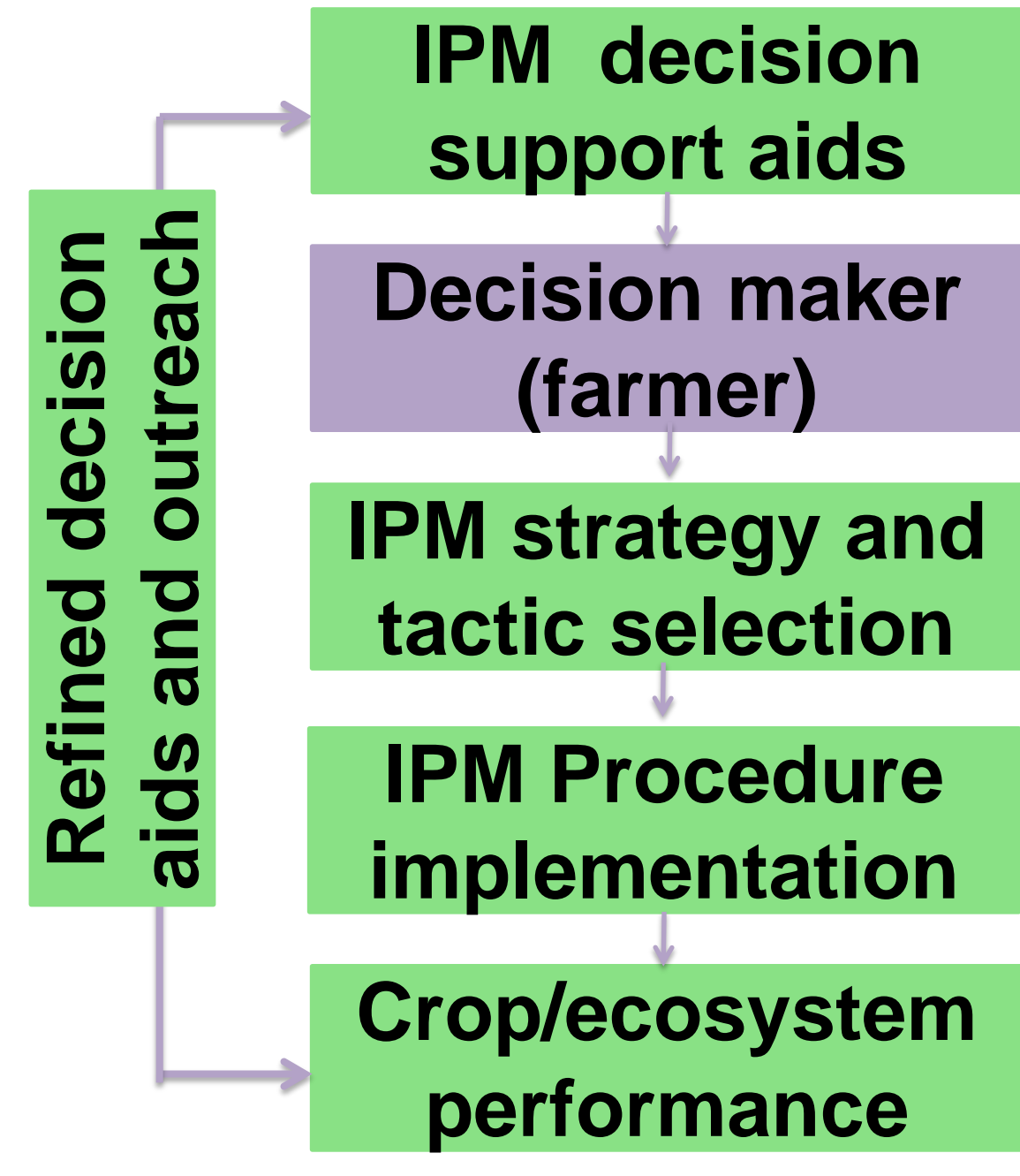
# Development and delivery of ecologically-based IPM packages for wheat in Central Asia

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## Introduction



When Tajikistan was part of the former Soviet Union, most farmland was devoted to cotton and other export crops. While wheat has become the main staple food crop in Tajikistan, a deficit of research and knowledge about effective IPM systems remains and pest losses are high. To address this food security need, Michigan State University (MSU) in partnership with University of California-Davis, Kansas State University, ICARDA, AVRDC, and several local research and academic institutions and NGOs is implementing a regional IPM program in Central Asia as part of the USAID IPM CRSP. Collectively, these partners are conducting IPM component research, and delivering IPM package demonstrations to local farmers.

Fig.1

## Methods

### 1. Screening wheat varieties for resistance to cereal leaf beetle (CLB)

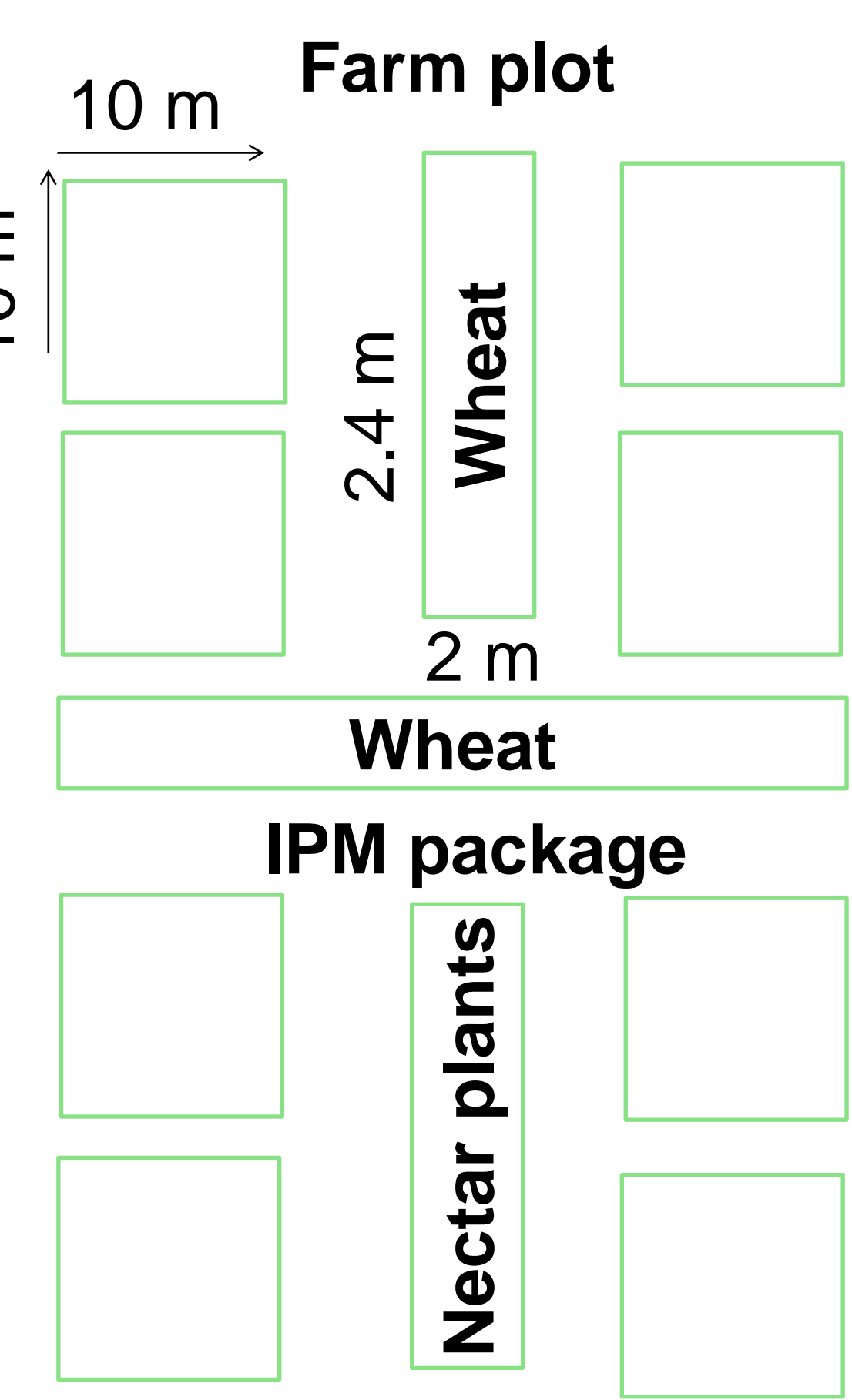
The cereal leaf beetle (*Oulema melanopus* L.) CLB is an emerging pest in Tajikistan. As part of our component research, two field trials were conducted in 2010-11 to screen wheat lines for resistance to CLB. Each experiment contained 36 experimental bread wheat lines and a susceptible check "Ziroatkor - 70" or "Ormon" repeated every nine entries. Each experimental line was planted in a single row 1m long with all lines replicated n=4 times in a block design. Prior to harvest each plot was independently evaluated for CLB damage by ranking the overall plot damage on a scale of <10%, 10-25%, 25-50%, 50-75% and >75%



The first field trial was established at the Research Institute of Farming "Zemledeliya" of the Academy of Agricultural Science of Tajikistan near the village of Sharora (Hissor District) and planted on November 21, 2010, using the wheat variety "Ziroatkor - 70" as the susceptible check. When evaluated on May 24, 2011, CLB pressure was high at this site with 50-75% of the susceptible check damaged by CLB adults and larvae.

The second field trial was established near the village of Andreev Jamoat "Durbat" (Hissor district) and planted on December 9, 2010, using the wheat variety "Ormon" as the susceptible check. When evaluated on May 26, 2011, CLB pressure was moderate at this site with 25-50% of the susceptible check damaged by CLB adults and larvae.

### 2. IPM Demonstration Site for Wheat in Northern Tajikistan



The wheat IPM Package demonstration site focused on management of the Sunn pest (*Eurygaster integriceps*) and diseases including the wheat rusts: yellow rust (*Puccinia striiformis*) and brown rust (*Puccinia recondite*), and weeds. "Farmer Practice" plots planted to the variety "Starshina" were contrasted to "IPM Package" Plots consisting of the following practices.

- ❖ Plots of 10 x 10 m planted to "Ormon" a variety resistant to yellow and brown rusts, 4 reps.
- ❖ Strips of flowering plants including coriander (*Coriandrum sativum* L.), dill (*Anethum graveolens* L.), sweet basil (*Ocimum basilicum* L.), ziziphora (*Ziziphora interrupta* Juz.), marigold (*Calendula officinalis* L.) and winter cress (*Barbarea vulgaris*) were planted alongside the wheat plots to enhance Sunn pest egg parasitoids
- ❖ Best cultural practices were used including: planting date, seed rate, fertilizer application, and weed control.
- ❖ Hand collection of Sunn pest adults during 2-3 weeks beginning at the time of migration to wheat fields.

Fig.2

## Results

### Moderate to highly resistant to CLB of bread wheat lines from two research trials

Of the 36 experimental entries six, showed moderate to high levels of CLB resistance.

Table 1 Wheat lines moderately resistant to CLB (less than 25% damage) in one or more trials

Moderately Resistant Lines <25% damage	Trial 1	Trial 2	Both Trials
Erythrospermum 13\7\Stoparka	X		
Ferrugineum 205\ Frunsenskaya 60	X	X	X
Polucarlik 49\ Krasnovodopadskaya 210\P	X	X	X

Table 2 Wheat lines highly resistant to CLB (less than 10% damage) in one or more trials

Highly Resistant Lines <10% damage	Trial 1	Trial 2	Both Trials
Erythrospermum 13\7\Promin	X	X	X
Erythrospermum 13\7\Stoparka		X	
Polucarlik 49\ Krasnovodopadskaya 210\P	X	X	X
Frunsenkaya 60\Tardo\ Intensivnaya\Erit	X	X	X
Odesskaya	X	X	X

### Farmer Practice plots and IPM package on wheat yield components

"IPM Package" wheat yields were 41% higher than "Farmer Practice" plots ( $P \leq 0.001$  level, T-test). Farmer practice yields averaged 296.0 kg/hectare and IPM package yields 499.0 kg/hectare.

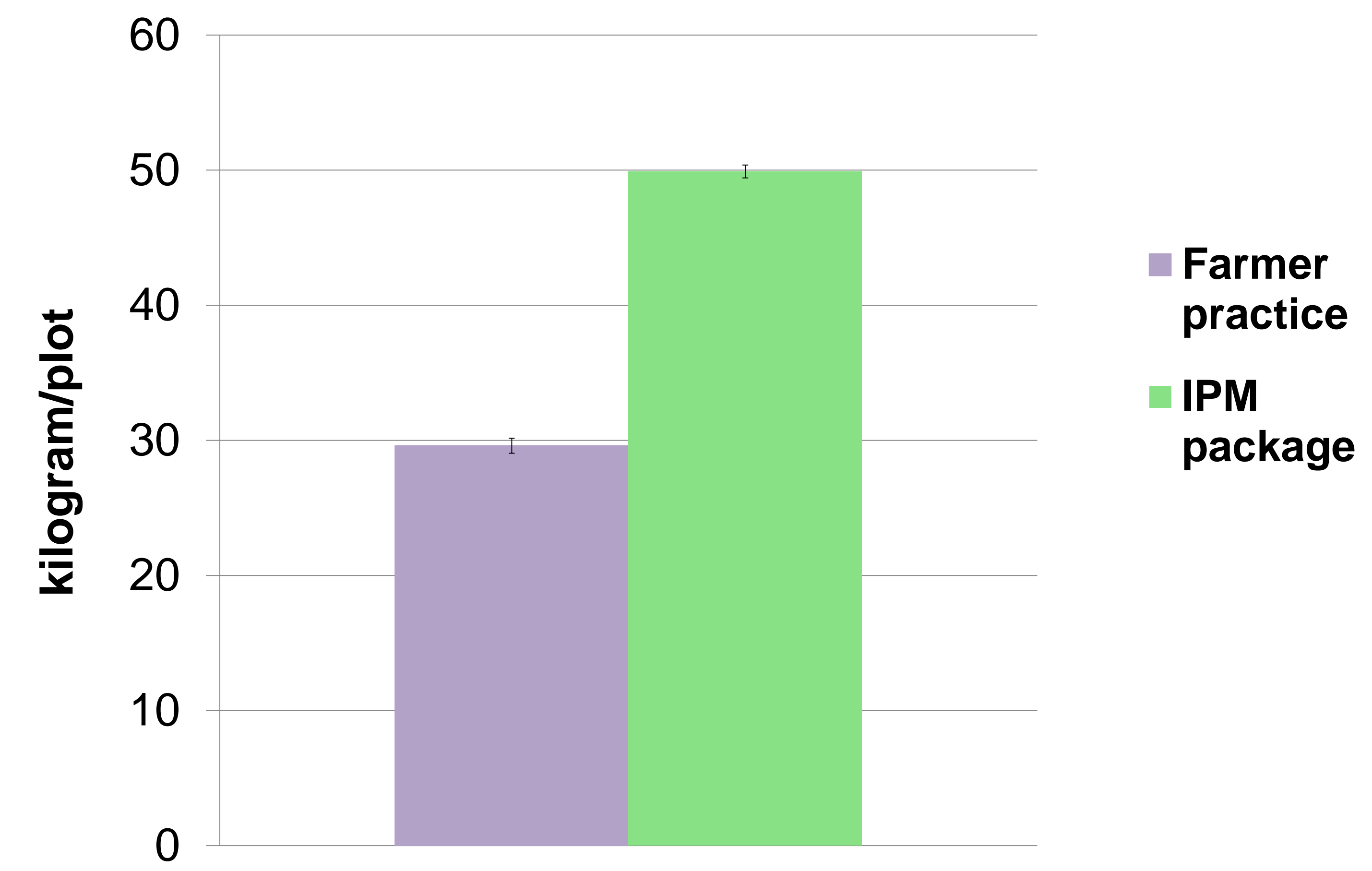


Fig.3 Yield of wheat in farmer practice versus IPM package plots

## Conclusions

Moderate to high levels of CLB resistance were identified in six ICARDA wheat lines.

"IPM Package" plots yielded significantly more than "Farmer Practice" plots.

Over 220 Tajik farmers and agricultural educators (121 male, 104 female) were trained in wheat IPM using these results in 2011.



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