INTEGRATED PEST MANAGEMENT

Integrated Pest Management was identified as a key element of sustainable agricultural development in the Policy and Strategy for Agriculture developed by Government of Pakistan as part of its response to increasing misuse/overuse of pesticides and their negative impacts on the society. IPM research activities at PARC seek to improve the livelihoods of small-scale farm families, thus helping to alleviate poverty and health risks while protecting the environment. We believe that this can best be achieved by nurturing farm families' capacities to self-reliantly manage their field ecologies, generate and evaluate new knowledge and technologies, and cooperatively work together with other farmer families.

Integrated pest research emphasized pest risk analysis system, development of IPM technologies and diversity analysis of pests and predator population.

Pest Risk Surveys and Analysis

- An extensive survey of wheat crop was conducted in Punjab, NWFP, and Sindh and 725 samples were collected and tested by ELISA for detection of barley yellow dwarf virus (BYDV). Based on ELISA tests 24.9%, 23.2% and 12.3% BYDV incidence was recorded in Punjab, NWFP and Sindh respectively.

Barley Yellow Dwarf Virus

- The surveys for foliar spots of wheat were conducted at seedling and booting stage of crop in all Pakistan. The fungi identified are *Alternaria, Bipolaris, Curvularia* and *Drechslera*. The most promonent fungus was *Bipolaris sorokiniana,* the cause of leaf bloch in wheat.

Foliar Spot pathogen of Wheat

- Khapra beetle damaged 12.07% stored wheat grain with a weight loss of 8.37%. Due to infestation of this insect the protein contents of the grain lowered as about 4.1%. Complete mortality was achieved by the application of CO_2 and NH_3 gas after 72 hour application.

Khapra*, Trogoderma granarium*

- Porcupine damage was assessed in vegetable crops (Potato, tomato and peas). Over all damage to potato crop was estimated to 4.23%. This damage was found at maturity stage of the crop. No damage was found to tomato and peas.

IMP Technologies

- Mancozeb and Vitavax were equally effective for the economical and effective control of powdery scab of potato.
- Neem extract 2% solution effectively reduced the potato jassid population in comparison to the commercial pesticide with no residual effect. It also reduced the potato aphid population when compared with commercial pesticides with no residual effect.
- Cucumber nursery raised in plastic sleeves protects the seedlings from the attack of red pumpkin beetle (0% plant mortality) as compared to the direct field sowing (46% plant mortality).

- Application of IPM models consisting of Male Annihilation Technique, Bait Application Technique, Sanitation and four applications of 2% neem extract on susceptible varieties caused 93% reduction in fruit fly infestation in 50 acres mango orchard in Kabirawala.

Male Annihilation Technique

Bait, Protein Hydrolysate

Sanitation

Neem Spray

- Application of IPM model in 35 acres guava orchard caused more than 90% reduction in fruit fly infestation. Feeding of fruit fly *Bactrocera zonata* adults continuously for 16 days on diet containing 1000 ppm of acetone extract of turmeric caused 85% mortality and 84.7% reduction in the adult progeny of surviving individuals.
- For rearing of *Chrysoperla carnea,* a strong predator, out of 4 hosts tested, *Brevicoryne brassicae* aphid was the best which prolonged larval period by 3-4 days with lower mortality rate.

Chrysoperla

carnea

- Application of 200 ppm of sweetflag (*Acorus calamus*) oil to wheat completely inhibited hatching of wheat moth (*Sitotroga cerealella*).

Sweetflag

Sitotroga cerealella

- Multi-choice food preference tests were performed to develop suitable bait against porcupine. A series of experiments were conducted and the order of preference was found as groundnut (cracked)>goundnut (whole)>maize>wheat>millet>rice and in case of mixtures the order of preference was maize+50% groundnut > maize+12.5% groundnut > maize (pure).

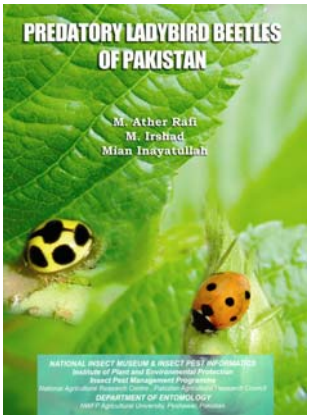
Multi choice feeding test

Damage of porcupine

- Two IPM models for the management of porcupine population in pine seedlings and maize crop were developed.
- Short-tailed mole rat (*Nesokia indica*) and Indian gerbil (*Tatera indica*) were pre-dominant species causing colossal losses to date-palm orchards. Feeding habit studies revealed that fruit and pith of the stem were consumed more than other parts of the tree.
- Early sowing of wheat at 80 kg/ha with a spray of Affinity showed a substantial control of broad leaved as well as grassy weeds resulting into enhanced grain yield. Lowest weed density was recorded from plots where Primextra (metolachlor + atrazine) was sprayed as a pre-emergence herbicide followed by the Dual gold (S-metolachlor).
- Weedicide Sencor @ 0.150 kg/ha followed by one hoeing effectively controlled weeds and in-turn produced maximum bulb yield (9.377 t/ha) in garlic variety Lahsan Gulabi.
- Weedicide pendimethalin @ 2.5 l/ha. followed by one hoeing effectively controlled weeds and in-turn produced maximum bulb yield (41.72 t/ha) in onion variety Swat-I.

Pest-Predator Biodiversity

- Three new species for Pakistan have been identified and added to the list of *Epilachna* beetles of Pakistan. *(Epilachna, olivacea, E. renderi* and *Afidenta gradaria).*
- Seventy five (75) species of predatory Coccinelids have been recorded and documented, among these 24 species and 3 subspecies were new records for Pakistan.



Predatory Coccinellids Book on predatory Coccinellids

- Pusa Insect Collection housed at CABI Regional Bio-Sciences, Rawalpindi was shifted to Crop Science Institute building, NARC. This national asset will be permanently housed at National Insect Museum building, NARC after completion.

Inauguration of Museum