Of Rice & Mice!

The Issue:

No rosy introductions, no sneak previews, lets do straight talk!

Rodents adversely affect humans in three main ways:

1. They eat agricultural crops in the field;
2. They eat, spoil and contaminate stored food; and
3. They carry diseases of humans and their livestock.

In the Asia–Pacific region, rodents are one of the most peril constraints to agricultural production. This region contains two-thirds of the World's poor—approximately 800 million people in 2001 and the majority of these people live in rural areas. Management of rodent pests in agricultural regions is therefore a high priority for reducing poverty.

More than 90% of the world's rice is produced and consumed in Asia, with rice producing 35–60% of the total food energy for the three billion people living in the region (Khush 1993). The pre-harvest impact of rodent pests on rice-based agricultural systems in 11 Asian countries: Bangladesh, Cambodia, People's Republic of China, India, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Thailand, and Vietnam causes chronic losses to production in the order of 5–

10% per annum. Today, it is not unusual for small-holder rice farmers to report chronic yield losses of 20–30% per annum, rising to 50% or even total crop loss in certain seasons. In Asia, a loss of 5% of rice production amounts to approximately 30 million tonnes; enough rice to feed 180 million people for 12 months! Postharvest losses are probably of a similar magnitude to pre- harvest losses. (Gary Singleton)

In India, losses of grain to rodents are estimated to be 25-30% postharvest at a cost of at least US$5 billion annually in stored food and seed grain (FAO 1999). Another author claims that this could be a conservative figure, based on estimates that there are in excess of 2.5 billion rats in India and each one potentially could cause US$10–15 billion in damages each year (Hart 2001). Postharvest damage by rodents includes direct consumption of stored grain and contamination by rodent excrements, parasites, and corpses and damage to containers (e.g., jute bags in India particularly). Also, in Indonesia, Suharno (1987) reported that rodent gnawing was the cause of treatment failures for insect pests, and increased treatment costs in bag stacks sealed under plastic enclosures after disinfestations with carbon dioxide.

There are 60+ rodent-borne diseases reported to affect humans (Gratz 1996). The foremost diseases for concern within the rice-growing agricultural zones

- Leptospirosis (6,000 cases in Thailand in year 2000 with 320 deaths; A. Payakaphanta, pers. commun.);
- The arena- and hantaviruses that cause haemorrhagic diseases (Mills 1999);
- The plague (*Yersinia pestis*); rat typhus (*Rickettsia* sp.); and
- Neuro-angiastrongyliasis (Prociv et al 2000).

The proposed solution:

The bad

Human ingenuity has come up with different ways of catching rodents. Many groups of people have developed specific traps and snares that either kill or capture any rodent that ventures too close. Four main kinds of traps are: single-capture live-traps, single-capture kill-traps and snares, multiple-capture live-traps & pitfall traps. With rodent population being as high as 10 per sq m. in some areas, this does not seem to be a feasible option. Additionally, the disposal of trapped rat in timely manner would be a humongous task.

The ugly

Poisoned baits and spray pesticides are used extensively in many parts of the world. It has been estimated that approximately 95% of all rodenticides used are anticoagulant baits. Not only are these baits easy to use and readily accessible over the counter, they are extremely effective in killing rodents and other pests. However, they also are lethal to non-target species, including human besides domestic dogs and cats of course!

These are mainly based on inorganic compounds which are not metabolized but are directly absorbed, distributed and excreted. Most of them have adverse effects on mutagenicity, teratogenicity and reproduction of humans. The table following this article, compiled by Dr. Gary Singleton based on personal visits to rice fields will demonstrate the gravity of situation in various Asian countries. Currently only toxic rodenticides are used which should be curbed as early as possible.

The safe

Employing innovative masterbatch formulation techniques and focusing on environmental issues and safety norms that are the call for the day, polymer-specific masterbatch for effective rodent aversion is now possible. Rodrepel™®, a patented non- toxic & non- hazardous product by C-Tech Corporation, has been successful in keeping the rodents away from plastic articles in non hazardous manner. Rodrepel™® does not kill but only repels the animal by making use of the sensory mechanisms.

Rodrepel™® is available in form of masterbatch which can be added to polymer during extrusion of tubings and pipelines used for irrigation. Once Rodrepel™® is present in these irrigation tubings, rodents will automatically shoo away from the rice field. For post- harvest protection of grains/ rice, Rodrepel™® containing containers/ bags can be used.

The Conclusion:

Rodents cause tremendous economic hardship to Asian smallholder farmers, yet solutions for management can be simple and effective. Innovative non-toxic and eco- friendly options need to be encouraged to enter the fascinating secret world of rats and work closely with farmers to assist them in their struggle against the hardships caused by rodents.

Country	National Government priority	Farmer priority	Lead Government Agency	Current Control by Farmers (government recommendation)
Bangladesh	High	High	BRRI, BARI (and NGOs)	**Reactive use of rodenticides; fumigation burrows; traps (rodenticides-no clear operational national policy)**
Cambodia	Moderate	High in regions	CARDI, AEC	**Community rat hunts; digging; reactive use of regions poison (ZnPh of variable quality) (reactive provision of bounties and ZnPh)**
China PR	Moderate	Unknown	Various	**Reactive use of acute and chronic rodenticides (chronic rodenticides)**
India	Very High in regions	High	AICRRP, funded by IRC, ICAR	**Bunds–low growth; trapping; reactive use of rodenticides in mass-scale control programs (rodenticides: surveillance then pulse application; fumigation)**
Indonesia	Very High	Very High	CRIFIC: RIR, DFCP	**Reactive use of poisons; fumigation (sulfur); hunting; bunds – low growth (except main channels); CTBS; bounty (EBRM: CTBS; bunds–low growth; synchronous crops; etc.)**
Lao PDR	High in Uplands	High in Uplands	NAFRI, Provincial Dept. Agric	**Bounties; hunting; digging; reactive use of poison (ZnPh; unknown Chinese) (no government recommendations formulated)**
Malaysia	Low	Patchy	MARDI, Dept. Agric	**Reactive use of acute poison (ZnPh); anticoagulants (use anticoagulant weekly for 8 wk after planting crop; barn owls as predator)**
Myanmar	High	High	MAS	**Reactive use of poisons; hunting; digging**
Philippines	Low	High	PhilRice, BPI, RCPC, NCPC	**Reactive use of acute poison (ZnPh); seasonal NCPC rat drives (postharvest); digging; bunds–low growth (sustainable baiting using anticoagulant after planting crop)**
Thailand	Moderate (High for health)	Unknown	DOA- AZRG, DOAE- PPS	**Reactive use of acute poison (ZnPh); digging; hunting (strategic use of chronic [or acute] poisons; pit traps)**
Vietnam	Very High	Very High	MARD: IAS- South, NIP- North, MARD- PPD and sub- PPDs	**Bounties; reactive use of poisons (ZnPh; unknown Chinese; BioRat; anticoagulant); plastic fences; CTBS (BioRat; cat as predator (developing CTBS/EBRM principles))**