agricultural sciences

PESTICIDES

Vaporizer protects food

Insects do a great deal of damage to food that is being stored for shipment or sale. Insecticides must be applied very carefully to avoid residues, however. Dusts and sprays all are prone to leave residues, and because of their physical nature they are distributed non-uniformly and tend to settle out.

Researchers of the U.S. Department of Agriculture in Savannah, Ga., report promising results with an insecticide vapor generator that may leave less residue and be cheaper than spraying techniques for warehoused food. Heated air is blown over pellets of dichlorvos in the generator. The resulting vapor diffuses uniformly through a warehouse and remains in the air longer than spray.

Dichlorvos, an organic phosphorus insecticide, recently was approved by the Food and Drug Administration for use on bagged or packaged foods, though it has not yet been registered for this use by USDA. It is also used in aircraft as a control on international transmission of pests (SN: 6/29/68, p. 615).

The vapor is effective in very small amounts, dissipates rapidly, and any residues that are left are short-lived. The generator can be used at night and the warehouse will be safe for human entry the next morning.

NUTRITION

Non-toxic emergency crop

The Indian legume *Lathyrus sativus* is cultivated quite extensively in certain parts of India for its high drought resistance, even though the plant is toxic and causes a temporary nervous disease called lathyrism. Commonly called khesari, its seeds are eaten under emergency conditions. Lathyrism is characterized by spastic paralysis of the lower limbs.

To end this voluntary poisoning Indian agronomists, supported by the U.S. Government, are attempting to develop non-toxic strains of khesari. The researchers, at the Indian Agricultural Research Institute in New Delhi, will screen the seeds of various strains of the plant in an attempt to identify the neurotoxins they contain. Then, starting with less toxic strains, plant geneticists hope to develop a non-toxic strain which retains high drought resistance and other desirable agricultural characteristics.

PESTICIDES

DDT isomer may be guilty

It is now generally conceded that dichlorodiphenyltrichloroethane as an environmental pollutant is responsible for declining breeding success in many carnivorous birds, even threatening some with quick extinction. The pesticide is concentrated in these birds and is believed to upset their calcium metabolism so that their eggs are too thin-shelled to survive until hatching. The DDT acts in a manner very similar to the female hormone estrogen, which controls growth and reproductive functions.

Biochemist Joel Bitman of the Agricultural Research Service in Beltsville, Md., reports that an isomer of DDT, not the ordinary form, may be the agent with the estrogenic activity. In the isomer, paorthora DDT, one of the chlorine atoms has been shifted from one site in the molecule to another.

In tests with rats Bitman found that the isomer produces estrogenic response, while pure DDT does not. In tests with Cornish hens and Japanese quail the isomer caused reactions in reproductive tissue similar to that caused by natural estrogen. Bitman suspects that the isomer might interfere with egg manufacture.

Commercial DDT is about 20 percent isomer. Bitman says that if he is right a fairly simple change in manufacturing processes could eliminate the variant.

SCHISTOSOMIASIS

Radiation controls diseased snails

Schistosomiasis is one of the world's worst uncontrolled parasitic diseases. Schistosome worms, often carried to man by snails, invade the blood vessels, causing blood loss and anemia, inflammation and enlargement of various organs, and occasionally death. Some 125 million people suffer from the disease around the world, mostly in underdeveloped areas. Ironically, irrigation intended to increase food production and allow modern agricultural practices to be used is also responsible for the recent spread of the disease, since irrigation ditches support huge snail populations.

Many efforts at snail control have been made. Most involve the use of chemicals and lead to pollution of irrigation water. A method now proposed by environmental engineers at Northwestern University in Evanston, Ill., would avoid pollution. Mirza Farvar and Herman Cember believe it should be practical to kill snails in a stream of water by passing it through shielded pipes containing capsules of radioactive cobalt 60, an intense gamma ray source. They say irrigation ditches could be so equipped without harming water or humans.

Quite heavy radiation is needed. In experiments the researchers found that snails exposed for an hour to between 150 and 250 kilorads all died within 11 days.

PEST CONTROL

Chemical sterilant for alfalfa weevil

The successful control of screwworms by releasing millions of radiation-sterilized males to compete with wild males in mating made this form of pest control famous. Now scientists at the Pennsylvania State University in University Park report initial success in a similar approach to alfalfa weevil control, using chemicals instead of radiation. The alfalfa weevil causes $9 million-worth of damage annually in Pennsylvania alone.

Dr. W. G. Yendol and R. K. Sprenkel report that a substance called apholate produces moderately high sterility in males, without killing them, when applied at a rate of 10 to 25 micrograms per weevil. Applications greater than this kill a considerable number of weevils. Eggs from females mated with treated males showed sterility ranging from 27 to 100 percent.