as optical switches. Thirumalai N.C. Venkatesan of Bell Laboratories in Murray Hill, N.J., who performed the work with colleagues at Bell Labs and the University of Arizona in Tucson, reported experiments with a device in which a thin layer (3 micrometers thick) of gallium aluminum arsenide was sandwiched between mirrors. A kilometer of optical fiber was connected to either side of the device. The idea, Venkatesan says, was to see whether light that had come through that much ordinary single mode fiber would trigger the action of the switch. It does.

From one side came a clock pulse, a regular beat from an argon laser; from the other came picosecond pulses from a signalling device called a word generator. When the two pulses coincide, the switch turns itself on and switches the information to a third line. When the two pulses do not coincide, the switch is off. Venkatesan sees applications in switching information from one carrier wavelength to another, in multiplexing (interweaving information from several messages in the same carrier channel) and in regeneration of signals that have been degraded by absorption and dispersion during transmission. Optical communications circuits now generally use electronic regenerators.

J.L. Jewell, of the University of Arizona, described a device in which a dye is sandwiched between mirrors to form what is called a Fabry-Perot etalon. The dye changes refractive index when heated, so that shining laser light on the device effectively turns it on. In the dark it relaxes back to the off position.

The device mixes two input beams, which may contain information and a "probe" beam to make an output beam. The output varies according to the relative characteristics of the inputs, and by manipulating these the device can be made to perform the functions of all the kinds of logic gates used in computer circuitry (OR, NOR, AND, NAND and XOR).

If the input beams are strong enough, the etalons will operate in sequence, generally a requirement for any useful logic circuitry. Since they have mirrors on both sides, they will operate in two directions at once. Logic circuits generally have large numbers of gates, and a particular piece of information must be addressed to the proper one for a given step in the operation. Jewell, showing a sketch of a planar array of these devices, explained that the input beams could be directed to the proper gate by mirrors and lenses.

—D.E. Thomsen

Garden home remedies give mixed results

Marigolds and nasturtium may brighten up a cabbage patch, but will they boost the gardener's harvest? Popular gardening books have recommended, as a non-toxic means of pest control, surrounding the crop plants with herbs or other plants whose aromatic leaves or flowers are thought to repel insects. Now scientists report that several species of companion plants do reduce the number of pests, but they also substantially reduce the vegetable yield.

The companion-plant strategy is one of several home remedies used to control garden pests that may have merit, but had not been tested under controlled conditions, say Carlton S. Koehler, Leslie W. Barclay and Thomas M. Kretchun. They evaluated several remedies at the University of California Deciduous Fruit Field Station in San Jose. In the test of companion plants, they grew cabbage and beans alone and in close association with anise, basil, catnip, marigolds, nasturtium, sage, summer savory and thyme. One vegetable plant was centered in a 14-inch square made up of four companion plants. The scientists periodically counted imported cabbageworm eggs and larvae on the cabbage plants and greenhouse whitefly nymphs on the beans.

The companion strategy was a failure in the beans. Those plants had the same or more whitefly nymphs than did the other plants. In different tests on the cabbages, anise, nasturtium, marigold and catnip reduced egg or larvae counts. Only marigold, however, significantly decreased the total worm damage to the cabbages.

The discouraging finding was that all companion plants tested reduced the weights of the cabbage heads. When the scientists tried planting only two companion plants per cabbage, they found no decrease in insect damage but still a drop in yield. Nasturtium had the smallest effect on yield; the average head of cabbage weighed 128 grams instead of the control weight, 301. Catnip had the largest effect, decreasing head weight to just 24 grams.

"Yield reduction probably resulted from competition for resources, such as sunlight and possibly soil moisture and nutrients," the investigators say.

Other home remedies for the garden appear more promising. Koehler and colleagues find that barriers of several types are effective against brown garden snails. These include screens and mounds of ashes, diatomaceous earth (a light, siliceous material) and ground cedar sawmill by-products. But sand barriers are ineffective, they report.

The scientists also find that soaps and detergents applied frequently to garden plants have some value for control of such pests as aphids and mites. But the soaps and detergents did not work as well as conventional pesticides. Again, as with companion plants, the yield suffered. In one test of cabbage plants sprayed with soap, the harvested cabbage weighed 23 percent less than untreated cabbages.

—J.A. Miller

The pill revisited: New cancer link?

The oral contraceptive pill, in addition to its role in preventing pregnancy, has been cast as both a cancer causer and a cancer preventer. Two studies in the Oct. 22 LANCET reflect on the pill's more ominous role — one links pill use to cervical cancer, the other to breast cancer.

University of Southern California (USC) researchers reported an association between use by women under 25 of pills with high levels of progestogen and subsequent breast cancer. Pills with low progestogen content increased breast cancer risk "little or none at all," they say.

The Los Angeles researchers matched 314 white, U.S.-born women with breast cancer diagnosed before the age of 37, to 314 women of approximately the same age who lived in the same neighborhood. Overall, women who began using the pill before the age of 25 and used it for more than six years were at nearly five times the risk of breast cancer.

The findings counter a report from the Centers for Disease Control in Atlanta and the National Institutes of Health in Bethesda, Md., in the March 25 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION, citing no increased risk of breast cancer among pill users. The Californians suggest that the older age of the women in the government study and the likelihood that the women had not used the pill at a young age may explain the discrepancy.

The government study also found that oral contraceptive use was responsible for preventing approximately 2,000 cases of endometrial cancer and 1,700 cases of ovarian cancer in the United States each year.

The second LANCET report blamed the pill for some cases of cervical cancer. Researchers from the Radcliffe Infirmary in Oxford, England, looked at the incidence of cervical cancer in 6,838 women using the pill and 3,154 women using IUDs. "All 13 cases of invasive cancer occurred in women in the oral contraceptive group; nine had more than six years' use of the pill," they report. They also found earlier forms of the cancer more often in the pill users.

Neither study recommends giving up the pill, but both suggest an increased awareness of the pill's darker side. Cervical cancer is treatable when caught early; the British group thus recommends that women who have using oral contraceptives for more than four years see a doctor regularly. For younger users, the answer may be a switch in pill type. "Assuming these new findings are substantiated," says Malcolm Pike, director of the USC study, "then the answer to this problem is simply for women under the age of 25 not to take pills with a high progestogen content."

—J.Silberner