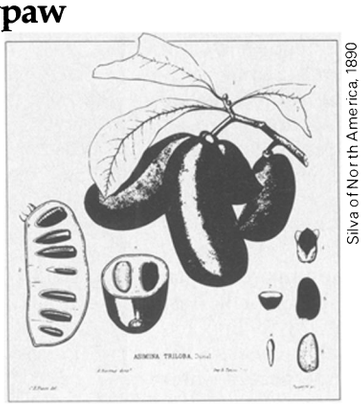
Agriculture

Picking up the pawpaw


Silva of North America, 1890

The fruit has a fragrant aroma, the custard-like texture of a banana and the rich sweet taste of a pear. The tree, with its attractive foliage, is hardy, not bothered by insects or disease and tolerant of shade. What more could you ask of a fruit tree?

The native American pawpaw is being promoted as a tree crop by U.S. Department of Agriculture scientists John P. Cherry of the Eastern Regional Research Center in Philadelphia and R. Neal Peterson of the Economic Research Service in Washington, D.C. "The pawpaw is found in virtually all of the eastern United States and extends as far north as southern Michigan. It shows an adaptability that should suit it to cultivation in all temperate, humid regions of the world," Peterson says.

Cherry recently did a nutritive analysis of the pawpaw and found it high in proteins, carbohydrates and unsaturated fats. It contains an exceptionally good balance of amino acids and is an excellent source of vitamins A and C, potassium, phosphorus, magnesium, sulfur and iron, he reports. Cherry and Peterson say research is needed on propagation and cultivation techniques, shipping and handling methods and selection of superior varieties from the diverse characteristics of the wild fruit. According to the USDA, such work may make the pawpaw, now called a horticultural orphan, one of the country's most valuable fruit trees.

Trufflers unite

To enhance scientific knowledge of truffles and truffle-like fungi, a new organization has formed. It is the North American Truffling Society, Inc. The society has accumulated data on almost 1,300 fungi collections, representing more than 100 species. The society can be contacted at 805 N.E. Colorado Lake Drive, Corvallis, Ore. 97333.

Chilling news

• Embryos of houseflies can survive being frozen to −20°C and then thawed. Roger Leopold of the U.S. Department of Agriculture Agricultural Research Service in Fargo, N.D., reports the freezing of insect embryos as one means of preserving specific insect strains. The challenges of insect embryo freezing differ from those of mammalian embryo work because the insects are in an egg with a yolk, which doesn't take well to freezing, Leopold says. He works with embryos late in their development when they already have differentiated segments. He says the goal is to be able to freeze embryos to the temperature of liquid nitrogen, −196°C, for storage and shipment.

Leopold is also working on an alternative method of preserving strains. It consists of freezing specific embryonic cells that eventually produce eggs and sperm. Such cells could be transplanted into embryos of a common strain, which at maturity would produce a mixture of germ cells. By mating the offspring, the desired donor strain could be reconstructed, he predicts.

• Tissue from a tree has been frozen to −196°C and then thawed and was still able to develop into tiny plants. Brent Tisserat of the USDA Agricultural Research Service in Pasadena, Calif., reports the freezing of undifferentiated tissue, called callus, from date palm trees. This achievement sets the precedent for long-term storage of the sets of genes of other valuable fruit trees.

Space Sciences

'Highly' conducting rocks on Venus

Signals emitted from a Pioneer spacecraft antenna and then bounced off Venus to return to the spacecraft's radio mapper have shown that the better reflecting regions of Venus coincide with the planet's highlands. More recently analyzed data taken by the same antenna, used to passively record thermal emission from the surface, indicate that those same highlands emit much less heat than the surrounding plains. The difference in emission can not be totally explained by the cooler temperature at higher elevations. Two researchers at the Massachusetts Institute of Technology in Cambridge, Mass., have used these results to suggest that materials of high electrical conductivity, which are known to be good reflectors but poor emitters, may be present in surface rock of the elevated regions. In particular, pyrite, a type of iron sulfide, is proposed as a conducting material candidate by Peter G. Ford and Gordon H. Pettengill in the June 24 SCIENCE. Laboratory studies on earth have found that rock composed of 10 percent pyrite could account for both the reflectivity and emissivity observed. Pyrites at high elevations are particularly interesting since they can be associated with the magma upwelling in volcanic eruptions, one of the possible origins of highlands cited by other scientists.

Subject of Titan drier than ever

Methane clouds gathering over methane oceans and eventually condensing into rain or snow to create methane rivers and glaciers have been part of an analogy many scientists have drawn between the role of water on earth and that of methane on Titan. The speculation about such liquid methane grew not out of direct evidence for it, but from suggestions that oceans could be a means of replenishing the supply of gaseous methane in Titan's atmosphere, which is depleted by a dissociation process that ends with heavier hydrocarbons settling to the surface. Methane clouds had also been used to explain the opacity of the atmosphere to electromagnetic signals. Now, two separate reports in the July 1 SCIENCE conclude that such liquid methane does not exist on Saturn's giant satellite in the form of global cloud cover or encircling seas.

One study, by Von R. Eshleman and G. Leonard Tyler at Stanford University in Calif., and Gunnar F. Lindal of California Institute of Technology in Pasadena, Calif., produced a temperature-versus-altitude curve deduced from Voyager occultation data taken as the spacecraft transmitted signals through Titan's atmosphere just before slipping behind the edge of the satellite. The curve showed no change in slope that would typically accompany cloud cover. In another work, F. Michael Flaser at NASA/Goddard Space Flight Center in Greenbelt, Md. argued that theoretical energy considerations place a lower limit of 98 percent on the relative methane humidity just above a hypothetical methane ocean, whereas only 70 percent humidity is implied by the Voyager data at the occultation points. Both works conclude that methane oceans completely covering Titan's surface are not present, and Eshleman goes on to say that the methane abundance may be so low that it does not condense anywhere. Local methane oceans may be possible, according to Flaser, but only if very slow surface winds allow wet air over oceans enough time to dry out before reaching regions of lower humidity.

Ongoing work by Flaser and John Pearl, also at Goddard, suggests that global hydrocarbon oceans up to 1 kilometer deep can give 70 percent humidity readings in the overlaying boundary layer. "If they're there, they're probably highly polluted," says Flaser, who cites a 50-50 ethane-methane mixture as one candidate for such an ocean. Eshleman sees a different scenario for hydrocarbons on Titan's surface, speculating that they may take a gooey form "more like a layer of higher petroleum product on a bed of water-ice . . . a sort of blacktop parking lot." Future Titan probes might find such a parking lot convenient.