

differences that generate the tornado's swirling vortex.

However, Dr. Simpson noted, there are a "bucketful" of theories to be tested, then accepted or discarded.

In the realm of the known are the overall weather patterns needed to spawn tornadoes. Whenever two large air masses—one moisture-rich and warm, the other dry and cooler—battle for supremacy, the stage is set for stormy weather. If other factors are right, the resulting thunderstorms may give birth to a tornado's vicious funnel.

### Temperature Difference Required

One factor is a big temperature difference between the tropical air and the colder air, such as temperatures in the high 90's ahead of the cold front, in the 60's behind it. High in the atmosphere is the swiftly moving jet stream, usually flowing from west to east, bringing with it drier, cooler air.

The width of the path over which the tornado funnel causes such damage averages less than one-quarter of a mile, and the length is usually 10 to 40 miles.

The tornado's destructive effects are awesome. Strong buildings are torn apart and scattered like kindling wood. Large trees

are uprooted and the bark stripped off. Persons and farm animals are hurled through the air, then dashed to earth. Slivers of wood are driven deep into boards and posts.

Although instruments cannot withstand such forceful winds and are themselves blown away, weathermen have estimated from such effects that the wind speeds within tornadoes are as high as 500 miles an hour.

A simple and spectacular experiment that shows how tornadoes twirl can be done by anyone with a record player. This is what to do:

Place a clear bottle of soda water, minus the label and the top few inches of liquid, on the center of the turntable and rotate the record player until the soda reaches the same speed. Drop in a pinch of sugar—any other solid particles will do, but sugar is recommended if the soda is to be drinkable afterward.

Bubbles of gas produce an upcurrent and hence an inflow, and a tight vortex, like that of a twister, will form suddenly.

Dr. J. S. Turner of the Commonwealth Scientific and Industrial Organization in Sydney, Australia, developed the do-it-yourself "tornado" using soda water.

• Science News Letter, 85:282 May 2, 1964

### BOTANY

# Spring Blooms All Year

► THE FLOWERS that bloom in the spring can be made to grow all year round by adding some extra light and chemicals.

Those shrubs known as woody ornamentals, such as azaleas and rhododendrons, can be treated with additional incandescent light and certain chemicals to make the bushes bloom earlier, produce more blossoms and stay blooming all the year.

Petunias and marigolds can be made to put out more blossoms, and chrysanthemums grow with shorter stems, explained Dr. Henry M. Cathey, horticulturist with the Agricultural Research Service, U.S. Department of Agriculture.

Remarkable effects on flowering plants can be caused by the careful use of additional light and various new plant chemicals that control growth, stated Dr. Cathey who demonstrated some of the flower examples at the USDA Food and Home Fair in Washington, D. C.

Agricultural scientists have been unearthing new facts about the light requirements of plants, and of the part played by a plant pigment called phytochrome in regulating the lives of flowering plants.

Petunia seeds, for example, will germinate more readily than usual when they are exposed to supplemental incandescent light during each 24 hours, Dr. Cathey demonstrated.

Germination rates of more than 90% are possible with the use of extra light.

In addition, the flowering of petunias can be speeded up by exposing them to extra light each day. Petunias are a type of plant that grows better when the days are long. When they are exposed to more than 12 hours of light each day, they produce many more blossoms.

Other garden annuals that respond to

more light include bachelor's button, China aster, snapdragon, phlox and verbena. When the young plants are given eight hours of light each day, and then set out in the garden, they will flower profusely all summer during the long hours of light.

Key pigment in this light-response pattern is the light-sensitive phytochrome which is a protein substance found in all plants. It triggers the flowering in a plant, Dr. Cathey explained.

By altering the light upon a plant, a person can alter the manner in which a plant also produces flowers, he said.

The stems of flower plants also can be made longer or shorter by careful use of various new chemicals, such as B-Nine, phosfon, and Cycocel.

• Science News Letter, 85:283 May 2, 1964

### AGRICULTURE

## New Automatic Milking Machine Developed

► MILKING MACHINES are now being developed that automatically release from the cow should attendants wander off and forget them. Irritation of the cow's udder can result when the last drop of milk is extracted. This can cause mastitis, an inflammation and congestion of blood in the udder, explains Prof. W. E. Petersen, department of dairy husbandry, University of Minnesota.

The new milking machines will have an automatic release of the vacuum to each quarter of the udder as the quarter is milked out, because it sometimes takes up to 35% longer to milk out some quarters than others.

• Science News Letter, 85:283 May 2, 1964

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