

*Progress Report*

# Sweetclover Hybrids Between Yellow and White Sweetclover Through Embryo Culture

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Objectives of the sweetclover improvement program in North Dakota have been briefly discussed previously in Bimonthly Bulletin, Vol. XVIII, No. 3, January-February, 1956. One phase of the program is concerned with development of varieties low in coumarin content. Coumarin gives sweetclover a bitter taste, and in spoiled hay or silage its decomposition to dicoumarin causes non-clotting of the blood and hemorrhaging when fed to livestock.

A number of white sweetclover lines are available which are uniformly low in coumarin content. All yellow sweetclover lines available, however, are high in coumarin, with little chance for selecting low-coumarin lines from the species directly. This suggests that one way to develop a yellow sweetclover low in coumarin might be through hybrids between white and yellow species and selection of yellow types low in coumarin from the progenies of such hybrids.

Yellow and white sweetclover do not cross and produce mature hybrid seed naturally in the field or from hand crossing. Seed pods are formed following crossing, but the embryos abort and the pods fall off after developing two or three weeks. Since hybrid embryos and seed do not fully develop under normal conditions, continuation of development of hybrid embryos into small seedlings on an artificial growth medium and later in soil may be the bridge to obtaining flowering plants, hybrid between white and yellow sweetclover. Consequently, a large number of crosses were made in the greenhouse during the winter of 1955-1956 between yellow and low-coumarin white sweetclover in an attempt to produce hybrids as a means of transferring the low-coumarin characteristic to yellow selections.

Pictured herewith are some of the sweetclover plants derived from young embryos, removed from crossed pods and subsequently established in soil. Embryos were cut from pods under a microscope and transferred to a sterile agar-medium containing essential plant food and sugar in two ounce stoppered bottles. Bottles containing transferred embryos were maintained in a chamber under ideal temperature and light conditions.

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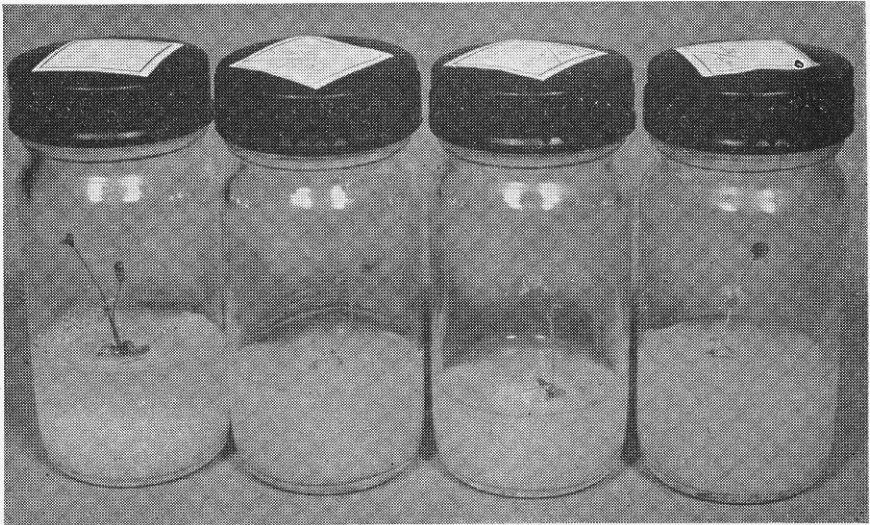


FIGURE 1.—Typical growth of young sweetclover seedlings about 3 weeks after young excised embryos from crossed pods were transferred to a sterile artificial medium. At this stage the seedlings had a well developed root system and were transplanted to pots filled with vermiculite.

Embryos which developed into seedlings with three to four leaves and a healthy root system were removed from the bottles and transplanted to small pots containing vermiculite. These seedlings were kept moist with a nutrient solution for about two to three weeks until vigorous root-and-top-growth had developed. Then they were transplanted to soil in larger pots and placed in the greenhouse to continue growth.

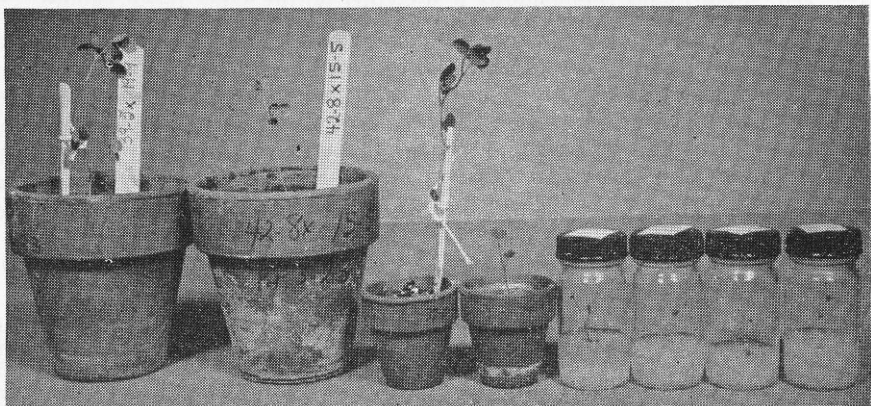


FIGURE 2.—Bottles at the right are the same as those shown in Figure 1. The smallest pots in the center contain sweetclover seedlings growing in vermiculite and kept moist with a nutrient solution. The two large pots on the left show plants fully established in soil following development of the seedlings for two to three weeks in vermiculite.

Approximately 20,000 flowers were crossed, using a series of yellow sweetclover plants as female parents pollinated from a wide source of low-coumarin white sweetclover plants. Around 900 embryos were transferred to the artificial medium with roughly one-third of the embryos making some satisfactory growth. Of those plants making growth in the bottles and transferred to vermiculite, over 50 have survived and were established in soil.

The important result of this research is that crosses have been accomplished between yellow and white sweetclover and excised embryos have developed into seedlings on an artificial growth medium and later became established as vigorous plants in soil. When the plants have flowered, a selfing and crossing program will continue in an attempt to develop a low-coumarin yellow sweetclover. Additional research is needed and will be continued to determine if the plants surviving are true hybrids which through subsequent breeding procedures can be a source for selection of a truly sweet yellow sweetclover, a variety low in coumarin and having the other desirable characteristics normally associated with yellow sweetclover in North Dakota.

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### A COW FOR THE SUBURBS

There is a growing demand in this country for useful objects in small sizes. We have dwarf fruit trees and midget automobiles. We enjoy the benefits of baby tractors, household elevators and one room air conditioning plants. We have developed small, compact food freeze units just large enough for a family. We have miniature turkeys and watermelons bred to fit into refrigerators.

It ought not therefore be surprising to learn that we now have a miniature cow which is said to be ideally suited to a domestic establishment in the suburbs. The breed of cow in question is not new. It is described as a native of the mountains of Ireland. It is named the Dexter, and it is being tried out on farms in Westchester county, New York, and in Connecticut.

The Dexter is a pretty little animal not much larger than a Shetland pony. It comes in black or red. It stands 38 inches high to the shoulder and weighs around 500 pounds. Compare that with the Guernsey's height of 50 inches and weight of 1,150 pounds. While the Guernsey gives five gallons of milk a day, the Dexter gives only two.

One great advantage of a midget automobile is the number of miles it can go on a gallon of gas. So, too, the Dexter admits of appreciable savings of "fuel." Where a Guernsey needs two acres of pasture and from three to four tons of supplemental hay a year, a Dexter can get along on one acre of pasture and one ton of hay.

What is more, the Dexter does not have to be fed on alfalfa and clover. It is said to have a taste for weeds, including wild grasses, thistles, nettles and even poison ivy. In fact on one farm in New York Dexters are used in place of goats to keep the weeds down as well as to give milk. We are told, further, that they do not enjoy pampering like the larger cows, scorn a barn in winter and protect themselves from cold with a shaggy coat of hair.

A century or so ago the Jersey was greatly fancied both in England and in this country as a private family cow. It was small and it gave a limited quantity of exceptionally rich milk. In the Dexter perhaps we have an extension of the same principle to meet present day needs.