Further Report on Milkweed Culture

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A study of the common milkweed (*Asclepias syriaca*) was begun in 1942 and a general report was published in Bulletin 333 of this station in 1945. Work on the project was discontinued at the end of 1948, but a few additional notes are presented here to bring the record up to date.

Chief interest seemed to be in the floss from the seed which was used for a year or two as a substitute for kapok. While useful as a substitute, it had no superior qualities and the difficulties of production were too great to encourage its further use. The plant has possibilities of usefulness for production of fiber and rubber, but here again the practical problems of production prevent any active interest in the plant at the present time.

Floss Production

The "floss" consists of the hairs produced at the tip of each seed, these serving as a parachute to carry the seeds in the wind. For this purpose they are very efficient. Each seed bears 1000 or more of these hairs. They develop in the same way as cotton hairs but are perfectly straight, smooth, hollow and rather brittle so that they are entirely unsuitable for weaving. Cotton hairs are flattened, kinky and tough.

One striking feature of the plant is the small number of seed pods produced. A field or patch in full bloom seems very full of flowers because they are in large clusters near the top of the stems and are not hidden by the large leaves. Flowers are produced mainly by the early stems. The plants continue to produce more stems but these are smaller and do not bloom so that only a quarter to two-thirds of the total number of stems may bear flowers. A single stem may bear four clusters of flowers, each with about 50 flowers. Each flower may produce two pods, but from this potential number of 400 per stalk only about four actually develop. It would of course be impossible for the stem to support a large number. We find occasionally as many as a dozen well developed, rarely as many as 25 small pods. Many more start to develop but die at various stages of development. Pods were harvested each year and number per stalk and total yield determined from the original plot established in 1943. The results are shown in Table 1.

Table 1.—AVERAGE YIELD OF PODS OF COMMON MILKWEED PER STALK AND ESTIMATED YIELD PER ACRE.

	1944	1945	1946	1947	1948
Average number of pods per stalk	4.0	3.1	3.4	3.8	3.6
Total bu. bags from plot (1/14A.)	10	16	27	23	8

Table 1 shows that within the five-year period covered the number of pods per plant remained the same. In general the average

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number per stalk in different lots was two to five pods per stalk. The yield per acre decreased after the third year. Several factors may have contributed to this though a *Fusarium* wilt was thought to be most important. The early stalks are the ones which produce flowers and in two years considerable injury resulted from a late freeze. Dry weather caused an obvious reduction in growth. General height of stems was less in 1947 than in 1944 and still less in 1948 when it was 83 percent of the 1944 height.

Pollination

As previously reported, the flowers must be cross-pollinated by insects. The flowers produce nectar abundantly and honeybees are efficient pollinators. Wasps and most of the larger flies also are effective. Most of the visiting insects collected from the flowers were flies of various species and families. Due to the structure of the flower one can tell by a careful examination whether or not pollen has been removed from it or carried to it. Field counts showed that in most cases there was ample transfer of pollen, but it would be difficult if not impossible to know whether the pollen came from another plant. The chances are in favor of its coming from the same plant, in which case it would be ineffectual.

Our earlier report showed one pod produced from 47 flower clusters which had been bagged and not pollinated and five from 23 clusters which had been self-pollinated. Some errors or accidents may have been involved, especially from too early removal of the bags. It had been feared that injury might result from leaving the bags on longer than necessary. Later work gave no indication of this.

The experiment was repeated in 1947 when seven pods resulted from hand pollination of two flowers each on 17 bagged clusters, while 21 clusters on the same series of plants bagged at the same dates and not pollinated produced no pods. These were bagged just before the first flowers opened and in three clusters a few flowers remained fresh 11 days later.

Seed Development

Flowering begins about June 25 and is largely finished by July 15. No seeds are shed until about September 1 or later. The leaves are killed by the first freeze and the main shedding of seeds occurs as the pods dry after a frost. Previous results had indicated considerable immaturity, which was believed due to insufficient time between time of flowering and the occurrence of frost. The date of flowering had not been known for these seeds so a further study of the problem seemed desirable.

A number of pods were marked in 1945 as soon as they showed indications of developing and five pods were harvested at five-day intervals from Aug. 23 to Sept. 17. The weight of 1000 seeds from these was 3.70, 4.29 5.65, 5.72, 6.52 and 7.08 grams respectively. These show a general trend but there was a wide variation, and the

heaviest seeds from the first collection were only slightly heavier than the lightest in the last one. These were from plants in different lots and not strictly comparable because there is a wide variation in size of seeds from different strains.

This was repeated in 1948, using two selected strains of plants. The material was not as extensive as might be desired and the results again showed much variation. From one strain 49 pods were available from flowers marked July 4 and 7; from another, 34 from flowers of July 10, 13 and 16. All were allowed to stand until seed was about ready to be shed. The average weight of 1000 seeds was 5.32 and 6.15 grams in the first strain, 7.04, 7.31 and 5.48 respectively in the second. Here again there was much variation in seed weight.

Germination tests of some of these the following spring showed a high and variable amount of dormancy. Germination tests were made on the 1945 seeds, the lots being selected to represent the range of weights. These germinated well, showing less dormancy than the 1948 seeds and barely perceptible less vigor in the sprouts from the lighter weight seeds.

Artificial Pollination

This was carried on with fair success in 1947 for 34 flowers. The rounded part of a hooked No. 1 insect pin was used to spread the plates slightly before pulling (or more often pushing) in the pollen masses. We had thought perhaps some strains would be more easily manipulated than others but did not notice more difference than could be accounted for by the size of the flower.

In 1947 several flowers were hand pollinated, collected 1, 2 and 3 days later and sectioned for microscopic examination. These have not been studied in detail but it appears that the pollen germinates about two days after pollination and fertilization takes place the third day.

Persistence of the Plant As A Weed

Some hesitancy was felt about making field plantings of a plant which is a deep rooted perennial and spreads by roots. However, its natural occurrence seems limited to locations where the water supply is better or disturbance is less than in the average field.

Selected strains were separated by five rows of grass as a buffer strip. Competition for water prevented any substantial growth of milkweed during the moderately dry summers of 1947 and 1948. The plants grew vigorously in marginal rows and ends where competition was small.

New shoots continued to come up vigorously from the original plot after plowing and three tillages during the first year. Seeds germinated freely in undisturbed areas and a few seedlings have been observed in the adjoining regularly tilled plots. A final re-

port on this phase cannot yet be made but, as at the beginning of the experiment, we see no evidence that the plant is likely to increase as a field weed or to persist under average conditions.

SUMMARY

Common milkweed (*Asclepias syriaca*) was grown in a field plot at Fargo for six years. It was readily established from seed. Growth was heaviest the third year after planting, after which it declined markedly. Dry weather seemed partly responsible, especially in a second plot where the milkweed rows were separated by grass buffer strips.

Pod production was relatively uniform throughout the period, averaging from three to four per stalk for different lots. The flowers do not fruit unless cross-pollinated. This is accomplished in nature largely by flies and bees. Artificial pollination is difficult but can be done. Flowering occurs from about June 25 to July 15 and seeds are not shed until the first frost or shortly before it.

Well established plots show considerable persistence to tillage, and seeds start freely in undisturbed ground, but the plant seems not to be considered an aggressive weed.

Because Bankhead-Jones—Section 5, federal grant funds are allocated to states on the ratio of their rural population to the total rural population, the 1951-52 allocation to the North Dakota Station has been reduced for the fiscal year 1951-52 by $1,491.52. For the same reasons the allocations under sections 9b-1 and 9b-2 of the same act have been reduced by $692.48, making a total loss of Bankhead-Jones funds of $2,184.00—(H.L.W.).

HORSES IN THE UNITED STATES

The horse population of the United States shows a steady decline according to figures recently released by the USDA. Expressed in thousands of head the numbers on June 1 each year were as follows: 1951-4,763; 1950-5,274; 1949-5,898; 1948-6,589. The average for the period 1934-38 was 11,570.