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HAIRY PERUVIAN ALFALFA

Hairy Peruvian alfalfa was introduced from Peru into the United States by the Department of Agriculture about the year 1899, and, although it has been under experimentation on the farms of Arizona and the Southwest, and also at various experiment stations since that time, its acreage at present is very limited. While the total area in Arizona at present planted to alfalfa, according to statistics compiled by the Arizona Council of Defense, is about 185,000 acres, estimates from the most reliable sources indicate that the area devoted to genuine hairy Peruvian alfalfa is not much above 3000 acres.

Economic qualities of hairy Peruvian alfalfa: The one quality of hairy Peruvian alfalfa which especially recommends it to the alfalfa growers of Arizona, and the Southwest in general, is its ability to grow in cool weather. It has been shown that this variety will grow when the temperature is as low as 49 degrees Fahrenheit, while the common varieties of alfalfa do not begin growth until a temperature of about 58 degrees Fahrenheit has been reached. While hairy Peruvian alfalfa will thus grow at temperatures considerably lower than the common varieties, it is not to be inferred from this that it is to be classed among the hardy varieties. In fact, when it is planted in regions where the teniperature during the winter falls below 10 degrees Fahrenheit, the plants winter-kill very badly, and therefore cannot compete with the common varieties in such regions.

In the low irrigated valleys of Southern Arizona it has demonstrated its ability to make some growth throughout the winter, and cuttings have been secured as early as March 1st, usually having attained by that time a height of about two feet. Hairy Peruvian alfalfa also recovers very quickly after cutting and is a vigorous grower, so that a few days' less time is required for each cutting of

this variety than is the case with common alfalfa, excepting during summer months when the difference is practically negligible. In the fall when cool weather begins, this difference in growth is again shown, and as winter months approach, the growth of the common alfalfa is almost entirely checked, while that of the hairy Peruvian is relatively more active throughout the winter. Its growth during winter is, of course, not as rapid as in the late spring and early fall. Occasionally, in December and January when the temperature falls below 49 degrees Fahrenheit, its growth is temporarily checked, but in no case have the winters of Southern Arizona been cold enough since its introduction to stop permanently its winter growth or kill the plants. It is upright in habit and few stems are left after each cutting. Stockmen have pastured this variety to a very limited extent through the winter, but usually good results are not secured in this way as the plant is somewhat handicapped in its early spring growth, being considerably weakened by the continual winter grazing. It never makes as rapid growth in the spring after it has been winter-grazed as where it has been permitted to grow, so that the total annual yield of hay secured where grazing is practiced is considerably less than where no grazing is allowed. However, where green pasturage is an important item, rather than total yield, this variety will perhaps serve the purpose better than any other. As a result of its growth during the cooler parts of the year, hairy Peruvian alfalfa has uniformly produced greater yields than any other variety that has been grown in comparison with it. At least one more cutting, and, in some cases, two more cuttings have been secured than from ordinary alfalfa growing adjacent and under similar conditions. Its total annual yield when grown in comparison with seven other varieties of alfalfa, including Italian, Baltic, two types of Algerian, Turkestan, Siberian and French, has been uniformly greater than either.

YIELDS OBTAINED IN 1916 OF HAIRY PERUVIAN ALFALFA IN COMPARISON WITH SEVEN OTHER VARIETIES ARE AS FOLLOWS;

	Pounds per acre
Average total yield of hairy Peruvian on 4 plots	15,676
Average total yield of the 7 other varieties	14,371
Average yield of hairy Peruvian on 4 plots, cutting Dec. 8	2,217
Average yield of the 7 other varieties, cutting Dec. 8	1,701
Average yield of hairy Peruvian on 4 plots, cutting March 23	5,500
Average yield of the 7 other varieties, cutting March 23	4,738

This table shows that in spite of the fact that all these plots were cut at the same time throughout the year the yield of the hairy Peruvian is greater than that of the other varieties. During the previous year the hairy Peruvian was promptly cut when about one-third of the plants were in bloom and one more cutting for the year was obtained from the hairy Peruvian than from the other varieties. It was thus shown that to obtain the highest yields of which this variety is capable it must be promptly cut at the proper time, which is in the early blooming stage. This is necessary not only to obtain the highest yields, but also if permitted to grow too long the stems have a tendency to become woody and therefore produce an inferior quality of hay.

Moreover, it is seen from this table that the yields from cuttings of hairy Peruvian made in late fall and early spring are greater than those obtained from cuttings of the other plots at the same times. The yield from the hairy Peruvian which was cut December 8 was at the rate of 2217 pounds per acre, while the average yield from the seven other varieties was 1701 pounds per acre. The yield obtained from the hairy Peruvian plots cut March 23 was at the rate of 5500 pounds per acre, while the average yield of the seven other varieties cut at this time was 4738 pounds.

Appearance of hairy Peruvian alfalfa: The young plants differ but little from other alfalfas, but as they approach the cutting stage they differ from common alfalfa in a number of ways. They have fewer stems per plant and are less branching. They grow taller and stand more upright. The stems are larger than those of common alfalfa, especially when the stand is thin. The character which most distinguishes this variety from the others is the hairiness of the entire plant, especially in the adult stage. The hairs are somewhat sparse at the base but the number increases on ascending the plant, so that at the top both the stem and leaves are covered with a dense growth of fine hairs. The veins of the leaves are of a somewhat whitish color, and serve to intensify the grayish green appearance of the plants. Hairy Peruvian alfalfa is easily distinguished from other varieties growing adjacent, both by the hairiness of the plant and by the grayish green color which it displays when seen at a distance. The common variety is quite smooth except that it has a few hairs near the top. When viewed at a distance the common alfalfa has a greener appearance and even when no alleyways separate the two varieties it is easy to distinguish where the one begins and the other leaves off. Hairy Peruvian hay, also, is said to have a characteristic grayish or "musty" color, but where it has been cut from fields having thick stands, this grayish color is not so apparent owing to the fact that the plants have very few hairs, except at the top, when the stand is thick.

The flowers of the hairy Peruvian alfalfa have a somewhat dark purple color, while those of the common alfalfa are violet. The seeds of hairy Peruvian alfalfa cannot be distinguished from those of other varieties. The only sure mark of identification is the hairiness of the plant.

The seeding qualities of hairy Peruvian alfalfa: In general, hairy Peruvian alfalfa produces seed about like other varieties so far as quantity is concerned. The seed crops taken from it during its trial at this Station for the past six years have shown that, on the average, it seeds as abundantly as the seven other varieties under trial. A seed crop was taken from all the alfalfa plots at the Yuma Date Orchard in 1915, and the average yield obtained from the hairy Peruvian was 488 pounds per acre, while that from the seven* other varieties was 329 pounds per acre. The highest yield obtained from any one of these four hairy Peruvian plots during the same year was 960 pounds per acre, while the highest yield obtained from any one of the seven other

varieties was 765 pounds, which was secured from a plot of Baltic alfalfa.

In 1916 the yields of seed obtained from the hairy Peruvian as compared with the other varieties, were practically reversed. The average yield per acre from the hairy Peruvian alfalfa was 578 pounds, while that from the seven other varieties was 674 pounds. The highest yield obtained from any one of the four hairy Peruvian plots was 613 pounds per acre, while the highest yield from any one of the seven other alfalfas was 787 pounds per acre, which was obtained from an Algerian plot. Reports from several growers of hairy Peruvian alfalfa in the Yuma Valley give results somewhat as shown above; that is, some credit hairy Peruvian as producing about the same quantity of seed as common alfalfa, while others state that it yields more. The evidence at hand, therefore, seems to indicate that hairy Peruvian alfalfa produces seed in about the Fame quantity as other varieties,

Water requirements of hairy Peruvian: Since the attention of alfalfa growers has been called to the importance of hairy Peruvian, quite a number of inquiries have been made as to whether it is drought resistant. While no definite experiment has been carried out to test the actual water requirements of hairy Peruvian alfalfa, yet it has been shown that if water is withheld from the plants too long when growing under irrigation the stems become very hard and woody before they reach the proper stage for cutting. As previously stated, this variety, even with an abundance of water, has large sterns and if allowed to stand too long before cutting produces an inferior quality of hay owing to the hardness of stems. For this reason hairy Peruvian is not recommended as a drought resistant variety nor is it suited to dry-farming regions. Owing to the fact that it grows through the cooler parts of the year the total amount of water used by this variety is probably somewhat greater than that of ordinary alfalfa.

Regions where hairy Peruvian alfalfa may be profitably grown: As stated above, hairy Peruvian alfalfa can be grown profitably only in regions having mild winters, where thorough irrigation is possible or where there is an abundant rainfall. The non-hardiness of this variety will always confine it to the warmer alfalfa districts. The sections in Arizona particularly adapted to this variety are the low irrigated valleys of the State, especially in the Salt River and Yuma valleys. It cannot be grown with profit in regions having an elevation above 5000 feet since the winter temperatures at this altitude are low enough to produce severe winter-killing; nor can it be grown under dry-farming conditions because, as before stated, the hay produced is too stemmy and not of the best grade.

Planting and the amount of seed: Although hairy Peruvian alfalfa is a very vigorous plant and very rapid in its growth, the best results cannot be expected with it unless the usual care is taken to prepare the land for seeding. Land which has too much fall or which is very irregular in its elevations always produces low yields. Whatever slope the borders may have lengthwise, they should be perfectly level crosswise because this condition permits the water to spread

uniformly over the entire border. The slope should be uniform because where the land has a great number of high and low places an uneven growth of alfalfa is always obtained, since more water will be secured by the plants in the lower places. Hairy Peruvian should be planted in the fall of the year when other varities are planted—usually from September to November inclusive. Evaporation is less during this period and throughout the winter, than it is in the spring and summer months, so that little irrigation will be needed while the plants are small, provided the land was well irrigated before planting. When planted in the fall the roots have plenty of time to make a good growth and get well down into the soil before the hot weather begins the following summer. If hairy Peruvian is planted in the spring, although its growth is very rapid, it will not be able to produce sufficient root growth to hold its stand when the hot weather of the summer conies on.

Owing to the fact that hairy Peruvian is less branching and produces fewer stems to the plant than other varieties, even when the plants are standing very thinly on the soil, it is necessary to plant more seed per acre of this variety than with the other more branching types. There are other reasons for this thick planting. It has been found that when hairy Peruvian stands very densely on the soil the stems do not grow so large nor do they become so woody before cutting time. When grown in dense stands, only the tops of the plants have any great amount of hairiness. About 15 pounds of seed of common alfalfa are sown to the acre. With hairy Peruvian at least 20 pounds per acre should be sown as this will give a thick stand in the beginning, and as the plants gradually thin out from year to year a good stand will be insured even after the plants are several years old. It is important to guard against poor stands with this variety because any vacant space will not be taken up by the production of an extra number of stems. Unoccupied space will be taken up by weeds which will serve both to reduce the quality of hay and also the yield, especially of the early spring cuttings.

Testing alfalfa seeds: Since regions where hairy Peruvian alfalfa is grown are almost entirely confined to the Southwest, alfalfa seed locally marketed as hairy Peruvian is grown exclusively in the Southwest For this reason any growers desiring to plant hairy Peruvian alfalfa should never buy seed which has been imported from other sections of the country, although it may be recommended as genuine hairy Peruvian seed. Before buying alfalfa seed of any kind the grower should be absolutely certain about three points; viz., the variety, the section of the country in which it was produced, and the quality of the seed with regard to both germination and purity. As stated elsewhere, it is impossible to distinguish hairy Peruvian seed from seed of the common varieties; therefore it is important to have the dealer certify that the seed is genuine hairy Peruvian, and also that it has been grown in the Southwest in regions to which hairy Peruvian alfalfa is adapted, and to have dealings only with thoroughly reliable and intelligent dealers and growers. The viability of seed, or its

ability to germinate, is indicated to some extent by its appearance Seeds which are plump and of a bright olive green color almost always give a high percentage of germination, while a brownish color usually indicates old seed, and, especially, if a large number of shriveled seeds are found a low percentage of germination may be expected In any case where the viability of the seed is questionable a germination test can be made with very little trouble This test may be made by placing one hundred or two hundred seeds between moist cloths or blotting papers and keeping them at a temperature of about 70 degrees Fahrenheit. At the end of a period of six days the number germinated may be counted and from this the percentage of germination may be determined Frequently at the close of a germination test with alfalfa seed it will be found that there are a number of seeds which are apparently in good condition but which have failed to germinate. These are called "hard seeds" and will not germinate as soon as the others because of the thickness and hardness of the seed coats, but will finally germinate if kept in a moist place for several days longer. For this reason seed analysts usually add one-third the number of these hard seeds to the number which have actually germinated. Before purchasing the seed, especially on the open market, it should always be carefully examined for weed seeds, as no variety of alfalfa will produce maximum yields when the field is heavily infested with noxious weeds. When the grower is about to buy alfalfa seed which is of good appearance so far as viability is concerned but which has weed seeds in it, he should determine before buying just what these weed seeds are, and if such noxious weeds as Johnson grass, foxtail, and pigweed are found, it should be rejected. This is especially important for those who are growing alfalfa for seed purposes on a commercial scale because when an alfalfa field once becomes infested with noxious weeds, especially of those kinds which do not readily separate from the alfalfa seed, It is either rejected by other alfalfa growers, or sold at a low price.

"Smooth" Peruvian: Since the introduction of the genuine hairy Peruvian alfalfa another variety of so-called "smooth" Peruvian alfalfa has been originated. The "smooth" Peruvian is but another name for alfalfa of the ordinary type coming from Peru, Argentina, and other South American countries. Tests at this Station have shown that this type is quite distinct from the true, or hairy Peruvian alfalfa, and that they are little or no better than our common alfalfa. It is the opinion of some growers that this "smooth" Peruvian strain originated by crossing genuine hairy Peruvian alfalfa with common alfalfa planted near,

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