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ALFALFA STUDIES

PROGRESS REPORT

BY

P. K. BLINN

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The Agricultural Experiment Station

FORT COLLINS, COLORADO

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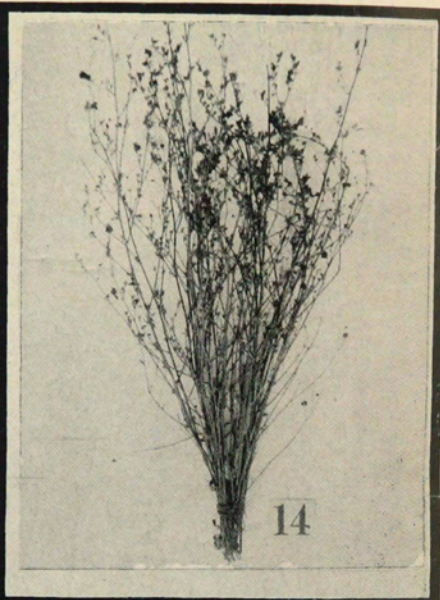
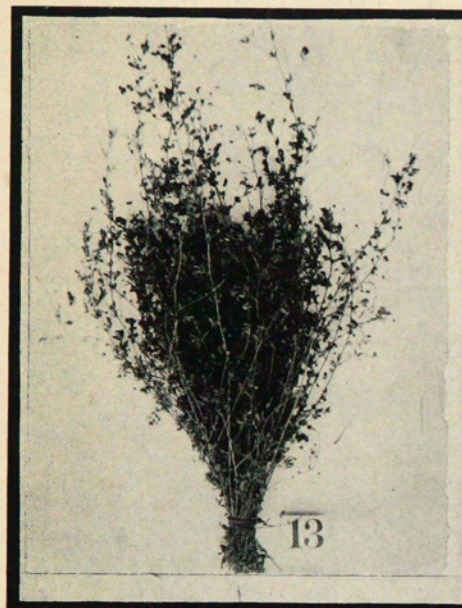


PLATE I.

No. 13. A-4, 7-12, yield of seed 5 grams. No. 14. Plant A-5, 7-18, no seed. Leaves
Desirable hay type. dropped by fungus.

No. 7. G-6. Arabian Plat just 4 months old from seed. In bloom.

ALFALFA STUDIES

PROGRESS REPORT

BY P. K. BLINN

Alfalfa forms the basis of our farm values throughout the western states; its unique adaptation to the semi-arid conditions makes it an invaluable asset to our agriculture. Owing to its power to survive a drought, or exist on scanty moisture, its deep growing root system enables it to reach a great but a deep-lying supply of soil fertility, that is beyond the reach of common plant roots, but which will in turn, become available to any crop if the proper crop rotation with alfalfa is established.

The power of alfalfa to restore worn out lands, and to build up soil that is deficient in humus and nitrogen, is apparent to the most casual observer, who will compare the crops grown on alfalfa sod, with those on ordinary soil, or even where barnyard manure has been heavily applied. Realizing these facts, it is evident that alfalfa must be grown more extensively in our crop rotations to maintain and restore the soil that is being depleted by the large crops of sugar beets and other products.

Many acres of alfalfa hay land are sacrificed each year, for the more remunerative returns from beets, cantaloupes or potatoes grown on alfalfa sod, and as a result alfalfa hay is becoming scarce, and the price is advancing to a point that will tend to dishearten the stock feeder. Also the high prices realized for hay has not encouraged saving the alfalfa crop for seed, consequently the price of good alfalfa seed is about equal to the cost when it was first introduced. In the estimation of some, the high price of land in the irrigated sections precludes the use of alfalfa as a profitable crop; especially on the small tracts and even on the larger farms, the proper proportion of alfalfa to other crops is seldom maintained and evidently the *real merit* of alfalfa is overlooked.

When expensive land is occupied with alfalfa for recuperation, which sooner or later will become necessary, it is apparent to all that it should be made to yield the highest returns possible, in hay, seed or fertility. To this end the alfalfa seed breeding work has been instituted. The idea was suggested in 1904, when investigating the insect injuries and other causes for the poor yields of alfalfa seed in the lower Arkansas valley in Colorado. It was then noted that there was a great contrast in the seed yields of different plants under apparently the same conditions, and also, that the type and quantity of hay from different individuals varied. Seed from some of the most promising plants were secured and sown the following

season in a comparative test, with common alfalfa and some Turkestan seed from Germany, furnished through Professor W. H. Olin. This test the first season revealed a better seed production in the plants grown from seed selected for heavy yielding traits, but the second season's growth revealed the superior hay producing qualities of the Turkestan plants, which also yielded as high as an ounce of seed from a single plant. The selections that season were principally from the Turkestan plants, descriptions of which were reported in Bulletin 121, Colorado Experiment Station. Through Mr. J. M. Westgate, of the Department of Agriculture, a large list of foreign and native strains of alfalfa seed from different states were secured for a wider base of comparison in the preliminary nursery work of selecting the best strain for the improvement of the qualities desired in alfalfa.

The new alfalfa nursery planted the past season comprises sixty-four different varieties or promising individual selections, each planted at the same time and given the same care and conditions, and could be considered under a fair comparative test. Each plat was designed to contain two hundred individual plants, twenty inches apart each way, and each plat separated by a path forty inches wide.

The plats are designated in the following manner, the first tier of plats on the north are lettered "A" and numbered from east to west, one to eight, the next tier to the south is lettered "B" and the plats in the tier are numbered the same as the first tier, and so on, the eight tiers are lettered to correspond to the first eight letters of the alphabet.

The individual plants in a plat are designated by two numbers, the first denotes the number of the row in the plat, which is numbered from north to south, the second number denotes the plant in the rows, which are also numbered, but from the east to the west.

The nursery was planted April 15, 1907, and thinned to single plants about the middle of July. The following is an epitome of the first season's observations:

- Plat A-1—Individual selection No. 1, from Turkestan variety, 183 plants. Irregular in type, undesirable for hay or seed compared to others.
- Plat A-2—Individual selection No. 2, from Turkestan variety, 163 plants. Irregular in type, rather subject to fungus diseases.
- Plat A-3—Individual selection No. 6, from Turkestan variety, 146 plants. Irregular in type, but fair for hay, no seed formed.
- Plat A-4*—Individual selection No. 17 (from single plant on railroad right-of-way, grown without irrigation). Very uniform in type, upright in growth, fine stems and leaves, good hay type and fair set of seed, 165 plants. Very continuous in bloom.
- Plat A-5*—Individual selection No. 12, from Turkestan plants, 179 plants. Irregular type, coarse stems, very sprangly growth, leaves shed off badly, no seed.

*See Plates.

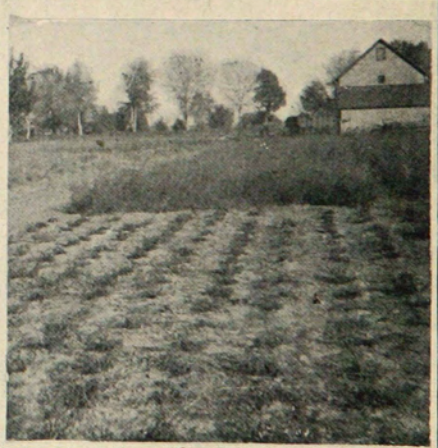
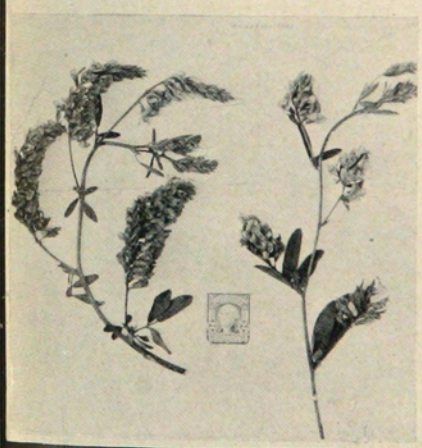
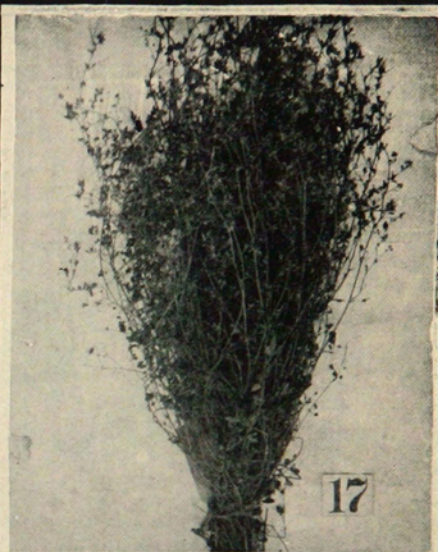
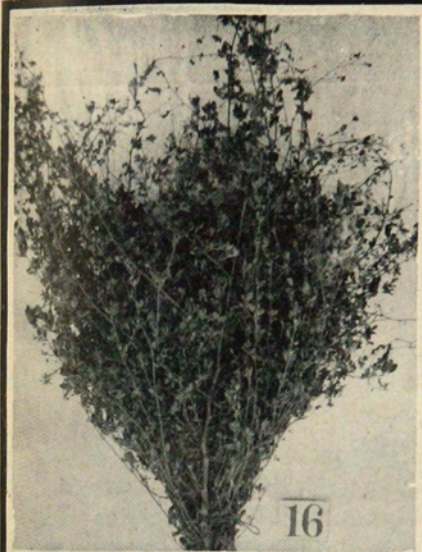


PLATE II.

No. 16. Argentine alfalfa. From Plat E-4, 6-14. Good hay and seed type. 12 grams of seed.

No. 17. Argentine alfalfa. From Plat E-2, 1-19. Good hay and seed type; 13 grams.

Contrast in size of bloom.

Plat A-4, after plants were cut.

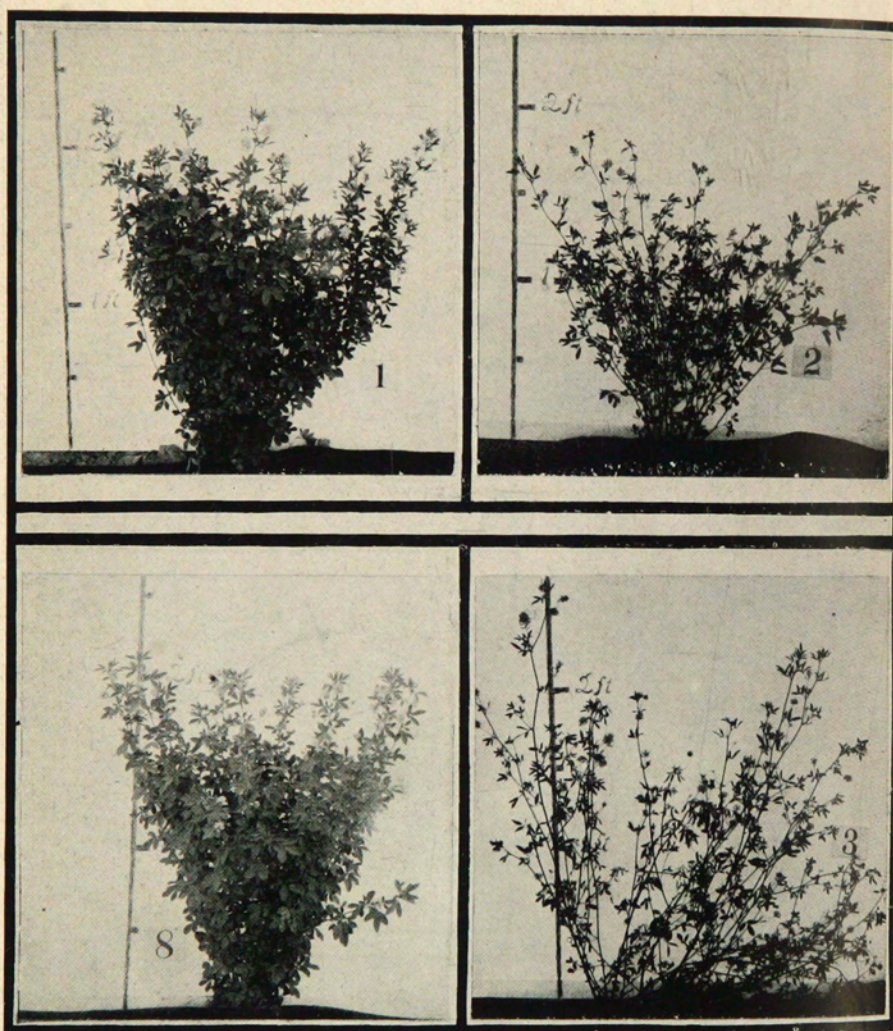


PLATE III.

No. 1. Arabian alfalfa, Plat D-2, 9-12.

No. 2. D-2, 2-9.

Contrast in individual plants same age.

No. 8. Plat E-6, 9-5. Arabian alfalfa.

No. 3. Plat D-3, 2-5. Mexican alfalfa.

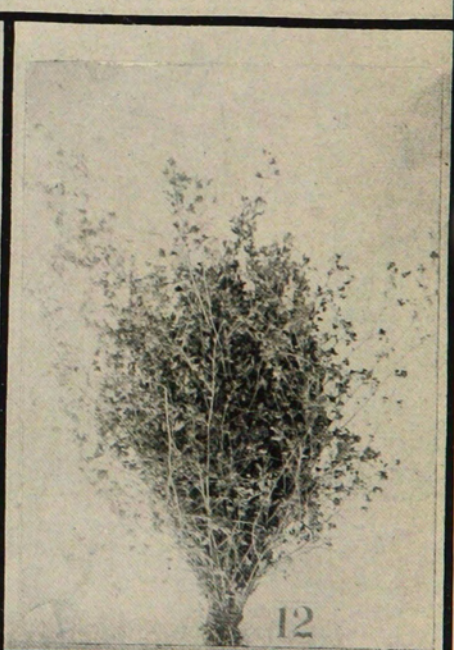
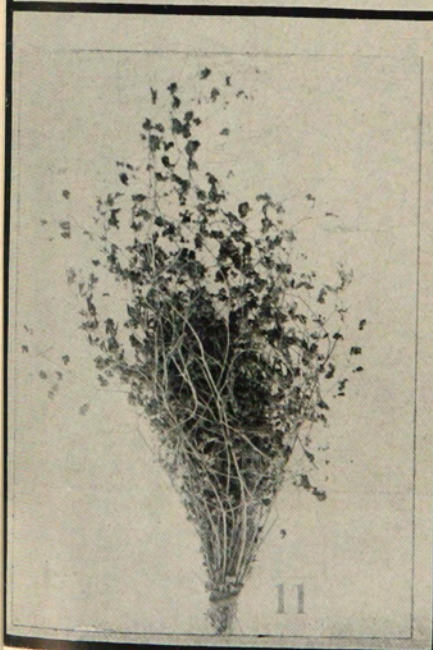
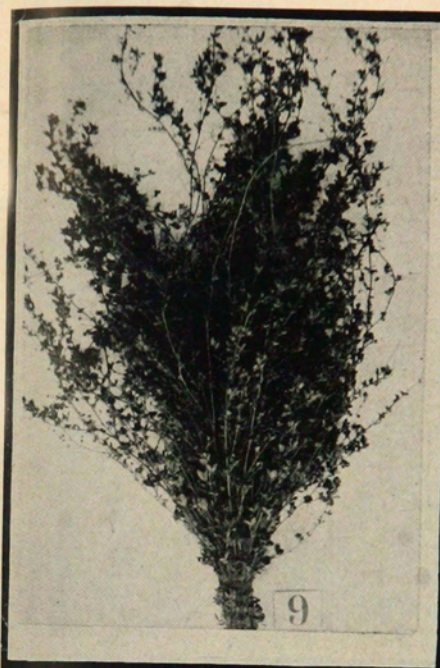


PLATE IV.

No. 9. Argentine. Plat E-4. Plant 7-6. Thickly set to leaves. Yield of seed, 2 grams.

No. 11. Utah. Plat D-8. Plant 6-1. Remarkable yield of seed. 24 grams from 1 plant.

No. 10. Ecuador. Plat E-8. Plant 7-1. Tall, stiff stems, set well to seed. Yield, 7 grams.

No. 12. Ecuador. Plat E-8. Plant 3-4. Fine combination of seed and hay quality. 15 grams.

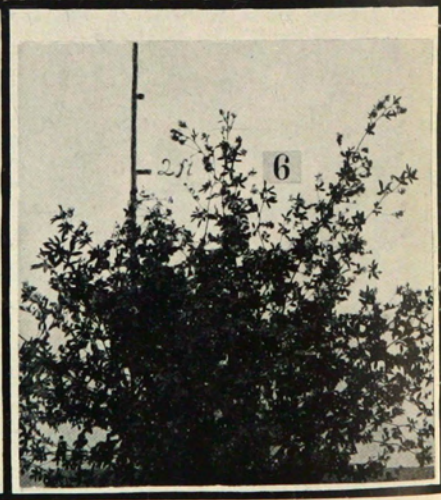
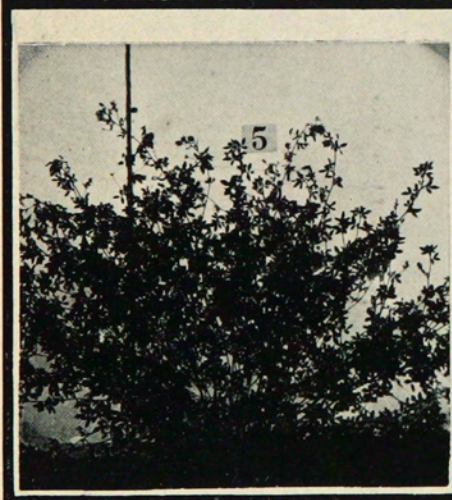
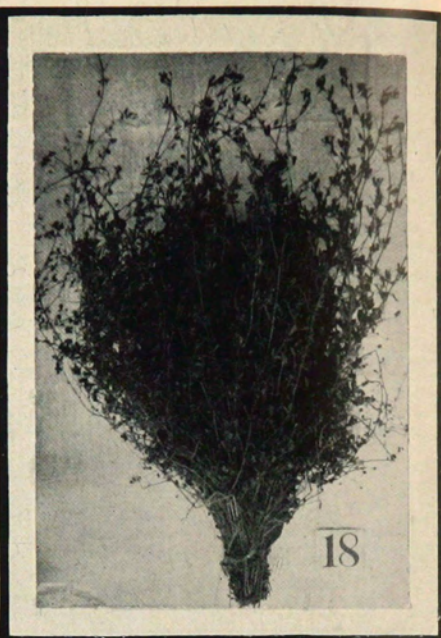


PLATE V.

No. 15, from Plat E-3. Dry land Nebraska. Plant 10-17, to left. Remarkable stooling trait, 250 stems from one single plant the first year. Yield of seed, 7 grams.

No. 18, from Plat D-5, 6-20 Sand Lucerne Pullman, Wash. Extra fine stems and leaves, fine hay type. Yield of seed, 6 grams.

Contrasting Qualities of Single Plants.

No. 5. From Plat E-4, 10-1. Argentine. This plant grew adjacent to No. 6, and shows that while they are similar in size there is a contrast in seed yield. Yield, 6 grams.

No. 6. From Plat E-4, 9-4. Argentine. This plant, while a fine hay type, is also a good seed yielder; produced 20 grams

- Plat A-6—Individual selection No. 16, from Turkestan variety, 153 plants. Irregular type, sprangly stems, but fair for hay, no seed.
- Plat A-7—Individual selection No. 10, from Turkestan variety, 147 plants. Fairly regular in type, but leaves much affected with fungus, no seed, hay qualities fair.
- Plat A-8—U. S. Department No. 991, Turkestan, 35 plants. Very poor.
- Plat B-1—U. S. Department No. 12231, Texas Turkestan, 74 plants. Very irregular in type, but some good plants, no seed.
- Plat B-2—Individual selection No. 3, Turkestan variety, 172 plants. Fairly uniform and hay qualities fair, no seed.
- Plat B-3—Individual selection No. 7, Turkestan variety, 183 plants. Quite uniform, tall, coarse stems, no seed, good yield of hay.
- Plat B-4—Individual selection No. 15, Turkestan variety, 180 plants. Fairly uniform in type, very dense set of leaves, very promising hay type, but no seed.
- Plat B-5—Individual selection No. 9, Turkestan variety, 185 plants. Tall, coarse stems, no seed, hay fair.
- Plat B-6—Individual selection No. 13, Turkestan variety, 181 plants. Fairly uniform type, hay good, no seed.
- Plat B-7—Individual selection No. 11, Turkestan variety, 151 plants. Poor hay type, few leaved.
- Plat B-8—U. S. Department No. 13999, Turkestan. from Washington, 72 plants. Poor stand, but good hay type, but no seed.
- Plat C-1—U. S. Department No. 12231, Turkestan from Texas, 29 plants. Poor plat.
- Plat C-2—Individual selection No. 5, Turkestan, 166 plants. Fair type for hay, but no seed.
- Plat C-3—Individual selection No. 8, Turkestan variety, 178 plants. Tall, stiff stems, coarse hay.
- Plat C-4—Individual selection No. 14, Turkestan, 166 plants. Short stems, hay fair, no seed.
- Plat C-5—U. S. No. 13521, Algeria, 66 plants. Hay fair, leaves free of fungus, no seed.
- Plat C-6—U. S. No. 12803, Setif, Algeria, 123 plants. Hay fair, no seed, leaves free of fungus.
- Plat C-7—U. S. No. 12846, Kebelli, Tripoli, 97 plants. Poor plat.
- Plat C-8—U. S. No. 16401, Dryland, Pullman, Wash., 83 plants. Irregular in type, some good plants for hay and seed.
- Plat D-1—U. S. No. 8823, Arabian, 61 plants. Regular type of upright stems, no seed, poor hay qualities.
- Plat D-2*—U. S. No. 12992, Arabian, 129 plants. Very irregular, no good.
- Plat D-3*—U. S. No. 11651, Pueblo, Mexico, 76 plants. Irregular type, but some good hay types, no seed.
- Plat D-4—U. S. No. 14786, Turkestan, 143 plants. Tall, coarse stems, fair for hay, no seed.
- Plat D-5*—U. S. No. 16399, Sand Lucerne, Pullman, Wash., 140 plants. Hay type good, seed fair.
- Plat D-6—U. S. No. 17698, Northern Montana, 156 plants. Extra good hay type, thick set to leaves, free of fungus, no seed.
- Plat D-7—U. S. No. 12847, Tebis, Tripoli, 60 plants. Much like Arabian alfalfa, upright stems, no seed.
- Plat D-8*—U. S. No. 18827, Utah, 121 plants. Extra good type for both hay and seed in some plants, rather irregular on whole.
- Plat E-1—U. S. No. 11652, Mexico, 98 plants. Irregular type, but some good plants for seed.

*See Plates.

- Plat E-2*—U. S. No. 13768, Argentine, 143 plants. Extra good hay and seed type, leaves free from fungus.
- Plat E-3*—U. S. No. 19566, Dryland, Nebraska, 169 plants. Good hay type, seed fair.
- Plat E-4*—U. S. No. 12549, Argentine, 142 plants. Irregular types, but some extra good for hay and seed.
- Plat E-5—U. S. No. 18470, Sand, Lucerne, Germany, 97 plants. Fair type for hay, no seed.
- Plat E-6*—U. S. No. 16267, Irrigation Arabian, 106 plants. Regular in type, upright stems, large leaves, but sun scalded, no seed.
- Plat E-7—U. S. No. 16317, China, 115 plants. Very sprangly, hay and seed poor.
- Plat E-8*—U. S. No. 14972, Ecuador, 170 plants. Wonderful set of seed, hay fair.
- Plat F-1—U. S. No. 11502, Siberia, 48 plants. Very poor traits.
- Plat F-2—U. S. No. 13564, Peru, 138 plants. Short stems, fine, thick set with leaves, good seed and hay yield, seed not filled well.
- Plat F-3—U. S. No. 9453, Turkestan Bokhara, 30 plants. Very poor types.
- Plat F-4—U. S. No. 12772, Turkestan, Oregon, 111 plants. Irregular, hay and seed fair on some plants.
- Plat F-5—U. S. No. 16403, Turkestan, Washington, 131 plants. Irregular, some good plants for hay and seed, stiff stems.
- Plat F-6—U. S. No. 1159, Turkestan, Kuldja, China, 30 plants. Plants flat on the ground, no good.
- Plat F-7—U. S. No. 19969, Highmore, South Dakota, 138 plants. Extra good hay and seed types in some plants.
- Plat F-8—U. S. No. 19968, Turkestan, Kansas, 96 plants. Tall, coarse stems, no seed.
- Plat G-1—U. S. No. 14497, Russia, 146 plants, Turkestan type. Hay and seed type fair.
- Plat G-2—U. S. No. 13437, Arizona, 144 plants. Hay and seed qualities good.
- Plat G-3—U. S. No. 18751, Turkestan, 154 plants. Coarse, stiff stems, few leaves, no seed.
- Plat G-4—U. S. No. 9395, Turkestan, 75 plants. Sprangly, stiff stems, few leaves, no seed.
- Plat G-5—U. S. No. 19508, Kansas, 132 plants. Well set with leaves, good hay type, seed fair.
- Plat G-6*—U. S. No. 18628, non-irrigated Arabian, 142 plants. Upright stems, sun scalded tops, no seed.
- Plat G-7—U. S. No. 13519, Spain, 142 plants, Arabian type. Hay fair, no seed.
- Plat G-8—U. S. No. 13436, Canada, Ontario, 114 plants. Sprangly type, hay and seed only fair.
- Plat H-1—U. S. No. 13440, Kansas, 132 plants. Thick set to leaves, good hay, seed set fair.
- Plat H-2—U. S. No. 13487, Texas, 146 plants. Good hay type, seed on some plants.
- Plat H-3—U. S. No. 679, Turkestan, Bokhara, 54 plants. Very poor type.
- Plat H-4—U. S. No. 9452, Turkestan, 96 plants. Very tall stems, few leaves, no seed.
- Plat H-5—U. S. No. 18591, Turkestan, Montana, 136 plants. Sprankly stems, hay and seed no good.
- Plat H-6—U. S. No. 18425, Turkestan, 123 plants. Sprangly type, seed and hay no good.

*See Plates.

- Plat H-7—U. S. No. 9450, Turkestan, Trans-Caucasia, 6 plants. Failure.
Plat H-8—U. S. No. 17792, Spain, 139 plants. Upright form like Arabian, hay and seed only fair.

In all our previous tests the Turkestan alfalfa has proven the most desirable in type for hay. It will be noticed from the above report of nursery that one-half of the plats were sown with Turkestan strains, yet the most leafy plants, and those producing the most seed, were not found in the Turkestan varieties. The second season's growth may reveal different records. Of the plats that produced seed, and were of promising type for seed and hay, the following selections were made, besides the individual selections of exceptional qualities:

- Plat A-4—Seed from 150 plants, fine, leafy stems, quite uniform seed producing, secured 11 ounces of clean seed.
Plat E-8—From 50 plants, of heavy seed producing quality, secured 18 ounces clean seed.
Plat C-8—From ten choice plants secured 87 grams of clean seed, plants of short, jointed stems, thickly leaved and fairly set to seed.
Plat D-7—Seed of ten plants of the Arabian type, 71 grams.
Plat D-8—Seed of ten plants of the thick, fine leafed type, 70 grams.
Plat F-2—Seed of ten plants of the short, dwarfed stems, 118 grams.

The above six selections were made with a view of sowing increase plats in order to get seed in considerable amount, as these selections seemed so much superior to the common alfalfa. Besides this the following single plant selections were made, for their individual merit: