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Growing Broom Corn in Colorado

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BROOM CORN IN COLORADO

By ALVIN KEYSER.

Owing to a general shortage in the supply of broom corn, due to a light crop in 1909, prices have been unusually high. First quality broom corn has sold for \$275 per ton. The normal price for good quality broom corn varies around \$60 to \$80 per ton. In the past, excessively high prices have frequently been followed by excessively low prices. This was caused by the greatly increased production induced by the high prices.

Growers should bear in mind that it is quite easy to increase the acreage. They should also bear in mind that a relatively small increase in the acreage may increase the production sufficiently to glut the market. When such a condition occurs, prices may fall below the cost of production. This has happened at numerous times in the past and the price of broom corn as a consequence has been as low as \$30 per ton. The ease with which the broom corn market can be "glutted" and the consequent wide variation in prices have tended to discourage extensive production.

According to the data collected from the broom corn manufacturers by Professor Cottrell and reported in bulletin No. 153, 500 to 600 tons of broom corn were used in Colorado in 1909. In addition about an equal amount was shipped into the state in the form of brooms and brushes. A portion of the broom corn sent into Colorado was again shipped out in the wholesale

trade. Only about 150 tons were produced in Colorado in 1909. Of this amount about two-thirds came from Baca county. Good broom corn was produced in the neighborhood of Fort Morgan.

Portions Adapted for Growing

Broom corn is a warm weather crop. It grows best where the days are hot and the nights warm. Very cool nights check the growth of broom corn and tend to produce a brittleness in the brush which materially decreases its value both for broom making and the market. This habit of broom corn, confines its culture largely to the plains region, for in but very few other places do the requisite climatic conditions prevail. For the same reason, warmer nights and weather, the southeastern portion is best adapted for its culture, altho good broom corn can be produced in the northeastern part of the state. It simply needs more care and better management to make it a success.

The yields of broom corn are not large. The portion harvested consists of the brush or head, upon which seed is produced and from 6 to 8 inches of the stalk. On dry land a good yield would be about one ton of brush from 4 acres. Under irrigation, one ton of brush to 3 acres is considered a good crop. Very little brush will be produced on irrigated land because of the high price of such lands and their ability to produce greater returns in other crops. We can expect, therefore, that broom corn production will be confined mostly to the dry lands.

Persons who are unfamiliar with broom corn production should thoroughly investigate the conditions necessary for success before attempting any considerable acre-

age. During harvest and the preparation of the brush for market a large amount of extra labor is required. This labor must be figured on and provided for in advance in order to insure harvesting the crop at the proper time. If only a small amount is grown, the crop can be all tended, harvested and prepared for market by hand. If any considerable acreage is grown special machines are necessary for preparing the crop for market. These with the necessary storage sheds for the proper protection of the brush represent a considerable investment of capital. The inexperienced grower is so liable to make mistakes in the management of the crop or in its preparation for market that it is always advisable to gain this experience on small areas. One can learn how to manage the crop just as well from a small acreage and the chances of loss are much less. Besides the crop may be managed without buying expensive machines which cannot be dispensed with if larger areas are grown.

Soils

Broom corn will grow on almost any soil. Warm soils produce a more desirable growth. Heavy clay soil or adobe is least adapted for broom corn production. Loams and fine, sandy loams when not too rich, produce the best brush and most profitable returns. Very rich soils tend to produce such a coarse growth that the brush is undesirable. That is to say, a brush coarser than the market demands may be produced. The same may be said with reference to the heavy clay soils, when conditions are right to grow broom corn on them, the brush is very liable to be coarse. The production of dwarf corn seems to be the most promising for the soils and climate of Col-

orado. Dwarf broom corn does better under Colorado rainfall conditions than other sorts. It will develop well under soil water conditions insufficient for the proper development of larger sorts. Most of our Plains soils are loams and sandy loams, the types upon which dwarf broom corn makes its best development.

Varieties

Although there are a number of so-called varieties being grown in various localities, the market knows but two sorts, standard and dwarf. Most of the so-called varieties are names derived from localities where broom corn has been successfully grown or seedsmen's names.

Preparation of the Land

In preparing land for broom corn the aim should be to get the soil in such condition that a uniform growth results. Usually the land should be disked early in the spring and plowed fairly early. To keep the soil in good shape and prevent excessive drying out of the furrow slice, the plow should be followed the same half day with the harrow or if necessary with the disk and harrow.

In case of heavy beating rains or weeds starting the surface should be worked as soon as dry. On the lighter soils and in the warmer climate of the southeastern part of the state, the soil may be prepared by listing or by using the disk furrow opener on early plowed land. The soil should be fairly rich but not excessively so. Manure if used should be applied to a previous crop or it may be applied lightly as a top dressing after the crop is up and growing.

Seed

One of the prime requisites to success in broom corn growing is good seed. Broom corn brush is harvested before the seed is developed. This undeveloped seed is stripped from the brush in the process of preparing for market. This undeveloped seed is not suitable for planting. But it is sometimes found on the market. Only seed which has been allowed to fully mature is fit for planting.

If one is growing broom corn as a regular crop in the rotation, it will pay to grow a broom corn seed patch. Desirable plants may be saved from the regular field. From these plants, those having the desired type of brush should be selected for planting a special seed patch. The seed for the general patch may be sowed from that remaining, taking care to throw out all heads having deformed or badly shaped brush. Weak brush, excessively coarse or excessively slender brush should also be thrown out. The seed may be best stored in the head in some dry place. This may easily be done by looping binder twine about the stalk or stem below the brush. In this way a large number of heads may safely be suspended by one string. In this shape they may easily be suspended from the rafters in a dry attic or hung from a wire in any dry place. Handled in this manner and thrashed out a short time prior to seeding, good, strong seed is assured. The best selected heads may be planted in a seed patch from which the seed for the general crop the following year may be taken. By growing a separate seed patch and keeping up continual selection of the best material, improvement may be made. There is good opportunity in Colorado for broom corn seed production. Good seed

is nearly always scarce and consequently usually commands a high price. If too many growers did not begin it, seed production would likely make excellent returns.

Broom corn is closely related to Kafir, Milo and other non-sacharrine and sacharrine sorghums. It is essential, therefore, to isolate the seed patch from all of these crops as they cross fertilize quite readily. The cross between broom corn and its near relatives makes very poor brush and is worth little or nothing on the market. It is perhaps needless to say that great care should be taken to get heads maturing at about the same time. The harvest will be greatly expedited if all the brush of a planting is in the same stage of development at the same time.

Planting

After the preparation of the seed bed, the next most important step is good seed. No matter how well seed may be bred or cared for if it will not germinate well it is no good for planting. Seed should all be tested. In order to get a uniform stand the seed must be good. Poor or ragged stands give rise to uneven brush. Some will be coarse and some fine. The market requires a uniform brush. A germination of 95 per cent or above is desirable. A germination of 90 per cent or less should be rejected if better seed can be obtained. With a germination of 95 per cent two quarts of seed, three pounds, will be sufficient to plant an acre. With a lower germination the amount of seed should be increased accordingly in order to insure the desired uniform stand. The germination can be tested in a home-made germinator, consisting of two dinner plates of the same size and several folds of muslin or

cotton flannel, so folded as to fit down in one of the plates. To make the test the cloth is wrung out of tepid water. One hundred seeds are then counted out and placed between the folds of the moist cloth. The second plate covers the first. The germinator should then be placed where it gets about the same temperature changes which will take place in the soil when planted, about 80 degrees in the day and not colder than 50 to 55 degrees at night.

For standard broom corn, 3 1-2 feet is about the proper distance between rows. Except in the driest situations dwarf broom corn makes a better type of growth where the rows are about three feet apart. The stand in the row should be about four plants to the foot or three inches apart for the standard and about six to eight plants to the foot for dwarf broom corn. Under Colorado conditions, drilling is much the better method of planting.

Broom corn may be planted in hills but this practice is to be discouraged under Colorado conditions. On very rich soils the planting may be slightly thicker, while on poor soils it may be good practice to have the planting much thinner.

Broom corn may be planted with the ordinary corn planter with broom corn plates. If the planter is not provided with the proper plates blanks may be purchased and drilled to the proper size and spacing. Plates drilled for maize may be fixed by plugging the holes with melted lead and drilling as desired. Extreme care should be exercised to get a uniform stand neither too thick or too thin.

Broom corn grows so slowly when young and requires such a warm soil that it is usually bad practice to list. Listing has a strong tendency to retard the early growth

and broom corn should be forced in this stage. Broom corn seed should be planted just as shallow as possible and have moisture enough to germinate. On light sandy soils, the seed may be planted as much as an inch deep. On clay or heavy loams the seed should rarely be planted more than a half an inch deep. Unless in a windy time, the soil may be rolled, if dry, to hasten germination.

Cultivation

Broom corn starts very slowly. On this account cultivation should start early to keep the weeds from crowding the young plants. Some form of cultivator with numerous small shovels should be used. To protect the small plants, sheet metal fenders or fenders with small rods closely placed are used. These protect the plants from being covered with earth or clods. Weeders similar to the Hallock or light harrows are sometimes used just as the crop is coming up. These must be run lengthwise of the rows to avoid uprooting too many plants. When the plants reach a height of two to three inches the cultivation should largely be with the small shoveled cultivator. When the plants are young, growth is very slow. After they reach a height of about a foot, growth is quite rapid. Cultivation should be frequent to prevent the formation of a hard surface. The aim should be to keep a loose, dry, granular soil mulch two to four inches deep on the surface all the time until the crop is laid by.

Harvesting

Time to Harvest.

The market demands a brush, green in color with tough, springy fiber. To obtain

such a brush, the growth must have been steady and as rapid as was consistent with the nature of the crop. Checks in the growth produced by drouth or cold nights or cold spells tend to produce a brittleness in the brush which materially reduces its value. If the soil were put in good condition prior to seeding and the proper cultivation followed, the bad effects of drouth or even cold spells may usually be largely overcome. With the above factors under proper control desired color and springiness of brush can best be obtained by harvesting when the bloom or anthers are falling from the head. Of course, the seed is undeveloped at this stage and has no value for seeding purposes. It is worth something for feed and may be used as manure for the land.

Method of Harvesting.

The method of harvesting differs whether one is growing standard or dwarf broom corn. Standard broom corn usually stands eight feet or more in height. In order to harvest the brush, the stalk must be cut or bent over so that the head will be in easy reach. To do this a regular process is followed called "tabling." This is not only convenient but keeps the heads clean.

Tabling.

To table broom corn, the stalks of two adjacent rows are bent diagonally across the intervening space in such a way that the brush end of the stalk above the sharp bend is supported in a horizontal position, with the brush ends extending about two feet beyond the opposite row. The height of bending varies according to the height of the broom corn, but is usually from two and a half to three feet.

In tabling the operator usually walks backward between two rows bending a few stalks first from one row then from the other. In this way a self supporting "table" is formed from each two rows, thus bringing the heads into convenient position for cutting. One man can table about as fast as two can cut. Three men will "table" and cut about two acres per day.

Cutting.

In cutting the operator walks along the spaces between the tables. A thin knife similar to a shoe knife is preferred for cutting. The brush is cut off so as to leave six to eight inches stalk on the brush. The sheath is not desired so it must be cut so as to remain on the stalk, else it must be pulled from the brush. Leaving more than eight inches of stem on the brush reduces the price. Six inches of stem is sufficient for broom making.

When cut the brush is laid, a handful at a time, on every other table. This leaves every alternate table empty so that wagons may be driven over the empty tables to gather the brush.

Dwarf corn is rarely taller than four to six feet. Thus it seldom needs to be tabled to harvest. The head of dwarf broom corn is usually partly inclosed in the sheath, often called "boot." On this account the heads of dwarf corn are usually pulled. Where the heads have a uniform state of maturity, they may be pulled and at once placed in wagons for hauling to the drying and curing sheds. Uniform maturity is greatly assisted by uniform stands and cultivation.

Rains at harvest time are more liable to injure dwarf corn than standard because the "boot," inclosing the head, may hold water

about the head. This may cause the stems to redden, thus reducing their value. Under similar conditions, dwarf broom corn requires much less labor in harvesting than standard.

The yield from dwarf broom corn can be expected to be about one ton from five acres on rich lands or under irrigation. On dry land the yield will likely run around one ton from five to seven acres.

As soon as cut the brush is ready to haul to the drying or curing sheds. If any considerable quantity is grown it pays to provide special dump wagons as the saving in labor will more than offset the extra cost.

The wagon is driven over the empty tables and loaded by a man working from each side. The brush ends are placed out, stalk ends in and overlapping. The dump wagons slide the brush off and leave it in a pile just as it was on the wagon.

Sorting.

Before the brush is hauled in it should be sorted. Crooked or unduly coarse brush severely cuts on the market price. All such brush can best be disposed of by discarding it entirely. It will sometimes pay to have a man go ahead of the haulers and give a final sorting.

Thrashing.

If any considerable area is raised the grower will need a broom corn thrasher. The regular thrasher costs about \$200. It consists of a cylinder similar to that of a regular grain thrasher. The broom corn does not pass through the beater as in thrashing grain, but is held against the beater until the seed is all removed. On the regular thrasher the brush is carried to the

cylinder at an angle by means of a toothed endless belt. When the seed is removed the clean brush is deposited at the end of the machine ready to be placed in the drying sheds. To run a regular thrasher requires a force of from twelve to fifteen men. Some growers keep a sufficient force tabling, cutting and hauling to also do the thrashing. The force quits the field a little early and thrashes and stores the day's cutting in the evening.

Where only a small acreage is grown, it is sometimes thrashed by mounting a small cylinder beater in a frame. The cylinder is run with some suitable power and the brush is held in the hand in small bunches until the seed is beaten off. This is a slow process but it will answer if only a small amount of brush is at hand. Care must be taken to get all of the seed off of the brush or the price will be materially reduced.

Drying.

The market demands brush of a bright, natural green color. To retain the color the brush must be dried in sheds which will keep off the strong, direct light of the sun. At the same time it must be dried rapidly. The main requirements are a good roof, with eaves projecting several feet and good ventilation in all parts of the shed. A drying shed large enough to accomodate 40 acres would need to be at least 48 feet long by 16 feet wide by 10 high. Mr. C. P. Hartley, recommends the following internal arrangement: "Place uprights, 8 feet apart in each direction, and nail to these, 4 inches apart, strips $1\frac{1}{4}$ inches wide, reaching across the shed. For a shed 48 feet long this plan gives six transverse sections, each 8 feet wide, with ends open for circulation of air. Slats, 2 inches wide and 8 feet long,

are required in large numbers, but are not put in place until the filling of the shed with brush is begun.

"For a shed of the size mentioned above 2,200 such slats are needed. Beginning at the bottom a shelf is formed by placing two of these movable slats across a section, resting their ends in the lowest spaces between the transverse strips nailed to the uprights. The brush is then evenly spread two inches deep upon these two slats, and then another shelf is made 4 inches above the first, and so on, till the shed is filled. If placed more than three inches deep the brush will not dry quickly and well, and may become musty or 'shed burned.'"

Rain or dew on the brush while drying is liable to tinge the brush red which injures its market value. Rain and bright sunshine will often produce brittleness in the brush which also reduces the price. Most Colorado grown brush put on the market was cured out of doors. For the most part this brush has brought much less on the market than properly cured Illinois and Oklahoma brush.

Bulking.

Although protected from inclement weather by the shed, dry weather cures the crop much better than damp weather. If the weather is dry, the curing process takes from two to four weeks. The end of the process can be determined by examination of the stems. If no moisture shows on twisting the stems, they may be considered cured. They should be taken off the drying rack at once and piled in straight regular piles to prevent undue bleaching.

Baling.

Baling consists in pressing the brush

into bales, by means of a baling press, and binding with wire. Broom corn manufactures will not accept poorly thrashed or baled brush. The brush should be left bulked until all dampness disappears. A hand press may do where only a small amount is produced. But if any considerable quantity is grown some form of power press will be required.

The bales are usually tied with large wire, which injures the brush less than fine wire. Bales usually weigh about 350 pounds when they arrive in market. One power baler will work about eight men and bale around ten tons per day.

Marketing.

The chief Colorado markets are Denver and Pueblo. The prices vary according to supply and demand. Good, first quality brush can always be sold. Off color brush, bleached, musty, crooked, coarse, brittle or poorly cleaned brush is always lower in price and often cannot be sold at all.

When broom corn is very scarce, as in 1909, manufacturers will sometimes buy brush that would be rejected at any other time. But even in such times it sells at a price much lower than good quality brush.

The following market grades are recognized:

Common, partly off color, red-stained and bleached, self-working.

Fair grade, slightly off color, self-working.

Good color and good fibre, self-working.

Fine fibre, dwarf, red tipped.

Fine fibre, dwarf, running well for whisk brooms.

Fair, crooked.

Good, well-handled, crooked.
Fair, medium, red-tipped.
Slightly tipped, smooth growth.
Good, green, smooth, self-working.
Choice, green, self-working, carpet stock.
Fair, medium, sound hurl.
Good, medium hurl.
Good, green, smooth, carpet hurl.
Choice, green, smooth, carpet hurl.

Conclusions:

Broom corn is quite drouth resistant and is consequently adapted for Colorado plains.

Inexperienced growers should only attempt a small area at first until they have learned the requirements of the crop.

Good seed must be obtained. This can be done best by each grower producing and caring for his own seed.

To raise any considerable acreage requires sheds and shed equipment, dump wagons, baler, thrasher, and a number of small items. These will probably cost from \$1,200 to \$1,500 and up. The equipment will last several years if properly cared for.

Broom corn may be profitable under dry farming, but it will seldom pay under irrigation.

To succeed with broom corn it should occupy a regular place in the rotation and uniform acreage planted from year to year.

Checks in the growth due to cold or drouth produce a tendency to brittleness.

Wetting by rain or dew and drying tend to produce brittleness and red-tinged brush.

Strong light bleaches and gives uneven color.

To produce a good quality of brush takes care, but it brings good prices .