

# Muscadine Grapes and Grape Products

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I am pleased to have this opportunity to meet with the Horticulturists of Florida. It is good to return to the State where I began Muscadine grape work for the Bureau of Plant Industry eleven years ago; and appropriate to report back to you on the progress made since that time, for this progress is due in large measure to the Experiment Station and the horticulturists of Florida who gave cordial co-operation at the start and have been rendering substantial assistance ever since. Here at Ocala, I conducted my first Muscadine grape breeding work for the U. S. Department of Agriculture, though I also worked in the New Smyrna district and at Glen St. Mary that same season. I am, moreover, glad to have this chance to direct attention to the adaptability of north Florida for Muscadine grape production and suggest that you give consideration to the developments taking place in the industry. I wish, in addition, to solicit your continued support, collectively and individually, for the Department's activities in the hope that our joint effort will have sufficient momentum to cause real benefit through the development of a larger and greater Muscadine grape industry in the South-East.

In general, the aim of the U. S. Department of Agriculture Muscadine grape project is to foster by means of investi-

gational work; educational work; and co-operation with other agricultural, educational and industrial agencies; the development of a great fruit industry for the southeastern United States—an industry which will mean the utilization of part of our idle lands; sales for nurserymen; attractive and profitable employment for horticulturists, farmers, and laborers; means to attain an education for boys and girls in demonstration clubs; business for merchants; tonnage for railroads; and delicious fruit and fruit products for all.

The Department's *reason* for having undertaken this work, if additional reason need be stated, is that we believe firmly that the development of the native fruits and other economic plants of a region is a sound policy even though recognizing (as evidenced by the Bureau's office of Foreign Seed and Plant Introduction) the desirability of introducing and testing the plants of other regions.

In the case of the grape the policy of developing the native species is fully vindicated by grape history. The grape industry of the Old World is largely the result of years and years of plant breeding and selection of better varieties from the native grape of Europe. This European grape was then introduced into the northeastern United States, but the in-

dustry there was characterized by a long series of failures until John Adham, Ephriam Bull, E. S. Rogers, Jacob Moore and others resorted to the native "Fox grape" and by selection and breeding presented to the public such grapes as Catawba, Concord, Salem and Moore's Early. In the Central West, Herman Jaeger, Jacob Rounnel and others produced varieties from the native "River-Bank grape" and "Summer grape" of the region which were capable of withstanding the dry hot summer climate in Missouri and the neighboring states. In Texas, grape growing became an industry when T. V. Munson developed the native "Post Oak grape," giving us varieties of it such as the "Brilliant," and following up the work of Jaeger and others with the "Summer grape." The European grape industry on the Pacific Coast was saved from the destructive Phylloxera only by resorting to our native grapes as a stock on which to graft a top of the foreign type. In the tropics only the tropical species seem to withstand the Nematode. And in the Muscadine grape region—the southeastern United States—we have planted and replanted the grapes of other regions only to see them succumb in time to insect, disease or physiological trouble\* under our climatic and soil conditions while our native Muscadine grapes grow to majestic stature and abundant old age; furnishing, each year, a yield of luscious quality and full measure, even though carelessly tended, with a steady sureness and regularity almost beyond comparison.

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\*This does not apply to Appalachia.

The work of the Bureau of Plant Industry with Muscadine grapes may be classified under four general divisions; namely, Survey Investigations, Production Investigations, Breeding Investigations and Utilization Investigations, and for convenience I shall describe our work briefly under these headings.

*Field Surveys* were the first investigational work attempted by the Department. This work extended all over the Muscadine grape territory and was preliminary to the establishment of special stations where investigations of a more technical nature might be pursued. This survey work yielded a thorough knowledge of the botany, early history, and nature of the Muscadine grape; its distribution; its good and bad features; its peculiarities; and its present status. In addition an extensive collection of standard and also little known but promising varieties was secured and planted at Willard, N. C., by co-operative agreement with the North Carolina Department of Agriculture as the nucleus of a large Muscadine grape experiment vineyard. This varietal collection has furnished material for grape-breeding investigation and has served as a comprehensive test of Muscadine grape varieties. Each year to the extent that our appropriation permits we endeavor to do enough field survey work to keep informed on annual yields, market conditions, and developments in the industry.

*Production investigations* began with the establishment of the Willard Experiment Vineyard. Here we investigate all matters relating to the production of the fruit crop. We study and develop the

best and most practical methods of propagating vines; fertilizing the vineyard; vineyard culture and inter-cropping; pruning; training; harvesting; handling; marketing, etc. We have, moreover, conducted very extensive pollination studies in relation to fruit production. The information gained from all these investigations has been published in large measure and if you are not familiar with it you may become so by writing to the Department for Farmers' Bulletin 709.

Simultaneously with the study of production problems the Department inaugurated its *Muscadine grape-breeding work*. Time will not permit of a full discussion, but I should state that this is, perhaps, the Department's most important contribution to southern viticulture—an expensive and indeterminate contribution which, if supported financially by Congress, will continue until the South's native grape has been completely ameliorated.

Breeding work is slow work and we have had only a ten-year period of effort in comparison with the centuries of breeding and selection of European grapes. Yet, even in this relatively brief period, very important progress has been made, thus indicating the great possibilities for progress with this substantial type of grape.

In substantiation of the foregoing statement let me cite some results obtained by the Department. From the more than 10,000 seedling vines produced, we have already selected more than 20 individuals, which are new varieties, and are considered worthy of complete test with a view to introduction to the public. We have, moreover, successfully hybrid-

ized the Muscadine grape and other species securing a collection of grapes of intermediate character. The oldest of these hybrids have fruited and show promise. The most important result of the breeding work, however, is the production of self-fertile Muscadine grapes. We now have over 1,000 individual seedlings of this type though such a Muscadine grape was unknown when our breeding work was started. All varieties, heretofore, required cross pollination with male or staminate vines; insects doing the cross pollination. Now we have high quality, productive, self-fertile varieties; varieties not only valuable in themselves, but suitable for pollenizing the older varieties like Scuppernong, James, and Thomas. These varieties are of importance in breeding work because they permit direct crossing in contrast to the former necessity of using a male (non fruiting) vine as one parent. These varieties are of a large clustered type as they are the result of perfecting the large bloom cluster of the male instead of the small bloom cluster of the female variety.

The *Muscadine Grape Utilization Investigations* of the Department have been an important phase of our activity during the last five years. The desirability of a greater and more varied utilization of our Muscadines was brought home to me in connection with the harvest of fruit from seedling vines in the Experiment Vineyard. While there was a ready sale for the Scuppernong variety we did not know what to do with the quantity of small, black berried, relatively acid fruit. It seems desirable to find some profitable means of utilizing it and investigations were inaugurated. As a result of the in-

vestigations of 1915, Farmers' Bulletin No 759 was issued by the Department describing a method for making a syrup of good quality. Suggestions were made relative to the production of this syrup for home use where a supply of surplus Muscadine grapes was available. In the next year our investigations were confined to a study of methods for preparing a large variety of home products. We reached the conclusion that it was possible to utilize the Muscadine grapes which were available on most southern farms (often the only fruit at hand), in the preparation of a large collection of good products for the home. It was evident that these grape products were of excellent quality, easily made, and relatively cheap. The directions for making them were published in Farmers' Bulletins 859, 1033 and 1075. Certain of the products offered such promise as to leave no doubt of their commercial possibilities. The more recent work of the Department has been in the line of perfecting and standardizing methods of production and making a commercial demonstration which, although conducted on a home and farm basis, has, nevertheless, given results which large commercial interests will at least recognize as suggestive of possible commercial application.

The Home Demonstration Organization was the first agency to recognize the possibilities in Muscadine grape utilization and make use of the Department results. It is not too much to say that southern horticulturists are indebted to these women and to the canning club girls for having played an important roll in pioneering and laying the foundation for

horticultural and commercial developments.

It would have been useless to hope for commercial progress had not the women of the South recognized the new products as meritorious. We first presented the knowledge that excellent home products could be easily and cheaply made from Muscadine grapes, to the southern women and advocated the use of surplus grapes in the homes in contrast to letting them go to waste. The women of the South put up the new products in quantity for home use and were enthusiastic as to their value, even insisting on premiums being offered for them at State and county fairs. In war days, moreover, they made these products to the greatest extent as a means of releasing other food supplies for use over seas, and as a sugar-saving device. The next step in the program was the planting in home, perennial gardens of the particular varieties the Department has recommended.

I leave it to Miss Partridge to inform you of the regular four-year grape course formulated for the canning club girls of Florida. Using the state of Mississippi as an example, I can state that I have authentic record of the planting of over 10,000 Muscadine grape vines of the Thomas variety by canning club girls and women in that state last year. The next step in the program was the encouraging of girls and women in the clubs to prepare each fall a greater amount of the Muscadine products than they needed for their own use with a view to selling the surplus locally to their neighbors and townspeople. Quoting again from the records for Mississippi, I can state significantly that the women in that state

made and sold locally over 1,000 gallons of Muscadine grape juice at an average price of \$2.10 per gallon. What can this mean for the homes of the South other than profitable, refined employment; self reliance; independence; higher education secured with funds from personal effort.

The final and logical step: the effort to standardize the club girls' products and thus enable them to reach the larger commercial market is now under way. It is believed that certain girls and women, advanced in club work, are ready to confront the commercial world as responsible business agents. Why should they not establish their own horticultural plantations and vineyards? Why not establish their commercial kitchens and capitalize the knowledge of preparing high quality fruit and vegetable products? The Department is ready to help them. During the past year the Department has worked out the standards for their Muscadine grape products. In co-operation with them at the Muscadine Experiment Vineyard, Willard, N. C., we have produced on a home basis standard Muscadine products and through the co-operation of the Atlantic Coast Line, Seaboard Air Line, and Southern Railways, introduced these into the dining car trade where they have ready sale. The quality of Muscadine products, already recognized by the women of the South, has now received the approval of the general public. I have brought with me a small exhibit of these products to illustrate the kind being sold under the Standard 4-H Brand.

While the Home Demonstration workers are enthusiastic and determined to reap the full benefit of their early efforts,

they, of course, realize their limitations in the greater commercial field. They realize that if the commercial Muscadine grape growing and Utilization possibilities are fully developed, it will be through the enterprise of southern horticulturists and business agencies.

The women of the South, I feel sure, will be satisfied with the knowledge that they have played an important role in the general co-operative development. I accordingly wish to call to your attention, as horticulturists of Florida, certain matters which should cause you to consider the advisability of pursuing Muscadine grape work; particularly in those parts of Florida outside of the citrus area.

Considering first the outlets for fruit produced and then the production side, I would call your attention again to the exhibit before you today as evidence of what may be practically done. While our last year's work is not yet finished so that figures are available, I may state that the public has consumed as much as 100 dozens of containers of Muscadine grape jelly on the dining cars of one railroad in one month. There are at least two large companies today manufacturing beverages requiring the use of Muscadine grapes. During the past year, I am told, that at one locality only in North Carolina one of these companies placed into casks 195 thousand gallons of juice for beverage manufacture, pressed from Muscadine grapes. The other company handled 400,000 pounds of Muscadine grapes in their presses. The production of genuine unfermented Muscadine grape juice from the Thomas and other high quality varieties of Muscadine grapes is a particularly promising field. The Depart-

ment has demonstrated that properly grown, carefully picked, graded, and packed fruit can be profitably shipped to southern city markets in small containers, such as the two-quart Climax grape basket. A market is also developing in cities and towns for bushel lots of Muscadine grapes suitable for home culinary preparation. The best varieties always bring good prices on Southern markets. The Department's records show that in Richmond, Virginia, Atlanta, Georgia, and Central Florida nicely packed Thomas, Scuppernong, and James grapes sold for \$3.50 per forty-pound crate. The vineyardists received \$130 per ton for Scuppernong and \$120 per ton for dark colored varieties in bulk. Ten years ago the very poorest grade of Scuppernong grapes—fruit jarred from the vine and dumped into barrels—sold for as much as \$35.00 per ton to wineries. Yields are dependent on the variety and the season, but the better varieties should average three to five tons per acre. In comparison with these data, statistics show the average grape yield in New York State to have been approximately two tons per acre and the average price \$35.00 per ton. In California the average yield is 3.8 tons per acre and the average price \$6.00 to \$75.00 per ton, depending upon the season and purpose for which sold. The Muscadine grape requires no spraying for serious disease or insect enemies.

Because of the long and late blooming season, Muscadine grapes are one of the most regular annual croppers of all our fruits. In some other states of the Muscadine territory, vineyards are being de-

veloped. In fact the call for vines by prospective planters during the winter just past, has been so great that toward the end of the season there was not a single Thomas or Scuppernong vine to be had at any price.

In light of these statements, therefore, I suggest to you as Florida horticulturists the consideration of Muscadine grape growing as a sectional industry in a program of diversified farming or horticulture and as one means of making useful part of your vast area of idle land.

Mr. Hume: Does anybody want to ask Mr. Dearing any questions? This is a very important paper, and if we let it go until after the next paper, which is also very important, we may miss the opportunity of getting some points and light on the subject that we may get now.

Mr. Dade: Mr. Chairman, I would like to ask if these can be grafted on to the native Scuppernong.

Mr. Dearing: The Muscadine grape is your native grape, the Scuppernong is a variety of the Muscadine. We have the Thomas, the James, the Flowers and the Mish. Among these varieties we have every color from almost a green into a purplish brown, then into pinks, reds, blacks and jet blacks. Certain varieties like Thomas are superior for all culinary purposes and the grape juice we have there is from the Thomas variety; that is the one we are particularly interested in calling to your attention; and the Thomas grape is a reliable fruit. That variety is one that behaves well for the horticulturist and one that behaves well for the home specialist who is making these products.

Mr. Dade: The one I spoke of is a very small berry that grows through the woods.

Mr. Deering: You may have in mind one species, native here in Florida, a small berry with slick small leaves and in rather large clusters. The other species, the *Rotundifolia*, of which the Scuppernong and Thomas are varieties, is native north of North Carolina and Georgia. The real Muscadine is native in certain parts of the State, but the *Munsoniana* is the southern off-spring of the north.

Mr. Dade: Do you think they can be grafted?

Mr. Dearing: As to grafting the Muscadine, will say it has the hardest wood of any species of native grape. For that reason it is very difficult to graft it. It is possible to make a graft but it is not possible as a commercial proposition.

Mr. Dade: How is it propagated? Do you propagate it from cuttings?

Mr. Dearing: Yes, it is propagated from cuttings or from layers. We are working on that now, for this reason; you get a much better plant, much more symmetrical plant and it will be possible to propagate in a way to keep up with the demand.

Question: Do you mind giving us the method of propagating by cuttings?

Mr. Dearing: If you take your cuttings in the fall, in November, when the vines are first dormant, put these cuttings in a dirt mound. Hold them dormant until far along into January or February. This will be better than to plant them out at once. The reason is that you want to hold them back until you can get growing conditions. When you plant them out

under those conditions the root will form before the top exhausts the strength in the cutting itself. If you succeed, you get a good plant, but if the shoots start and use up the strength in the cutting before the roots form, that particular cutting will die. Your aim is to get roots to form before the bud comes out and uses up the strength in the cutting. That means that long cuttings are better than short cuttings. They should be planted on the slant because they grow better than when planted perpendicularly. On the other hand if the surface soil dries to a great depth then you want those plants absolutely perpendicular.

Question: How many joints should you use in cuttings or do you split it up with a knife?

Mr. Dearing: We don't select any particular number of buds because the buds are close together. We use the wood of the previous season's growth and then cut them about sixteen inches long. It is perfectly possible if you have the facilities of greenhouse benches, to grow short cuttings of only two or three buds, but that is a more expensive method than the field method. I believe that for home use it would be well to make your own cuttings. I think you will find it more successful to let the people who know the business and have the facilities to produce those plants to do the work, and you purchase them at a nominal price. They can do it at a time when they are produced in quantity, just as we propagate from the apple, orange and other fruit. Normally we have a commercial nursery established for that phase of the work.

Mr. ———: You speak of shipping the fruit. Now the Thomas cannot stand

shipping. When you pick the Thomas the skin is broken; will they stand shipping?

Mr. Dearing: The Thomas will stand shipping better than the Scuppernong variety. When the berries fall off, the skin does not bruise and the juice get outside, like it does with the Scuppernong variety. If you put it in small containers there is not enough pressure there to break the berries. Because of its excellent quality, although it comes in a shelled condition, it draws a good price. People are ready to pay for that variety when they know it. Now we have other varieties of Muscadine grapes that will hold on to the stem and we are going to expect more development with those varieties than with the Thomas. We are hoping to be able to cross between the Thomas, which has fruit quality and breeding adherence, and others which have good appearance, and get an intermediate form which will be a still better grape.

But that is another phase which will come in our breeding work which I will not cover tonight, and which is really our most fundamental work. That is the Department's greatest contribution, the long-time problem of plant breeding. Our great accomplishment today in that field is the production of a perfect flower, a self-fertile type of grape. We have a thousand different types now; there was not one known ten years ago. We succeeded in perfecting a rudimentary cluster of the male type, making a perfect self-fertile cluster of the larger male form and in that way we have made a good beginning.

Mr. McQuarrie: I would like to ask Mr. Dearing in regard to the possibility of this industry in the South. I notice he mentioned north and west Florida; how would it do in the southern part?

Mr. Dearing: In the southern part of the State the Muscadine can be grown. I certainly advise that you plant it for home use. I do not think it advisable to develop it there as a commercial industry, as you have with your citrus fruit. In other words, it is too far south for it. It grows well in central Florida. The vineyard where we started our breeding work was at New Smyrna and we went there for our first breeding work because we found the largest collection of varieties there that we found anywhere in the South. The vineyard we used is now out of existence. It has been turned over to citrus groves.

Mr. Stewart: The exhibit is in the room to the right as you go out, and it is worth while seeing. We had hoped tonight to give you a taste of the Muscadine grapejuice, perhaps we could arrange that tomorrow and it is far superior to the grapejuice that is now on the market. It has a flavor of its own and it belongs to us, in the southeast.

The next paper will be delivered by Miss S. W. Partridge. She needs no introduction to any of us. In my work over the State I have come in very close contact with her work, and I want to say that she can inject more enthusiasm into a bunch of girls in their canning clubs than anybody I ever saw, and I know she is going to put some enthusiasm into you people tonight in explaining the work that her girls have done in covering by-products of fruit other than citrus. That is the topic she has taken, but she is also going to touch on citrus by-products. These beautiful jams have all been made by canning club girls under the direction of Miss Partridge and her assistants. Miss Partridge.