

# The Pennsuco Sugar Experiment

By WILLIAM A. GRAHAM

*Getting this company of sugar manufacturers [the Pennsylvania Sugar Company] interested in the Everglades to the extent of buying the necessary land and developing it has been characterized by one of the shrewdest dealers in big realty in Florida as the 'best day's work ever done for the state.'*

Immediately following World War I the world and the nation were faced with a sugar shortage which drove the price of sugar up and focused attention upon the possibilities of sugar production in new undeveloped areas of the world. One such area was the Florida Everglades.

A number of persons toured the Everglades in that period and gave glowing accounts of what they saw. For example, C. A. Burguieres, prominent Louisiana sugar cane planter and sugar distributor, made an extensive trip into the Everglades in 1920 and was enthusiastically optimistic about Florida's opportunities. According to a story in the *Florida Times-Union*, "[Burguieres] . . . stated that the sugar producing possibilities in Florida were truly wonderful and that he had seen cane there yielding over thirty tons to the acre and testing from sixteen to eighteen per cent sucrose as a usual thing. He had gone over that country a year or more ago and, where at that time one would find only a few acres, he would now see seven or eight thousand acres of the finest sugar cane to be seen anywhere on the American continent."

Reports such as this gave increased impetus to the already growing awareness of the potentialities of the Florida Everglades as a sugar producing area. These predictions were not totally without practical basis; for results of previous experiments, such as the St. Cloud Sugar Plantation as early as 1884, and the efforts of the Southern States Land and Timber Company in the Lake Okeechobee area beginning in 1915 offered hope for the future of sugar cane cultivation in the Everglades.

Florida newspapers and leaders eagerly advanced the theory that the Florida Everglades could and should become the sugar bowl of the nation, even of the world. The *Florida Times-Union* (Jacksonville) undertook an

active campaign in 1920 to promote the production of sugar in Florida, and the *Miami Metropolis* asked, in regard to an editorial of the *Times-Union* predicting that Florida would soon be supplying a million tons of sugar a year, "But isn't it exasperating to think that Florida could be acting as the nation's sugar bowl right now if her people had not been so everlastingly slow?"

It seemed that Florida could hardly wait to accept her position as a leading sugar cane producer. There was little doubt concerning the success of sugar production. The only uncertain factor was the matter of time involved in getting large scale cultivation under way. In 1919 there were a dozen sugar plantation projects scattered throughout the state.

This enthusiasm for the development of the Florida Everglades as a major sugar cane producing area, coupled with the desire of South Florida residents for the establishment of some stable type of industry and/or agriculture to bolster that area's economy, assured the hearty approval of the development of the adjacent Everglades land by the Pennsylvania Sugar Company.

Prior to 1919, B. B. Tatum, large Everglades landowner, devoted considerable time in efforts to interest a substantial company in the Everglades as a location for sugar cane production and refining. Finally, in the fall of 1919, after several trips to Philadelphia, he was successful in making an agreement with the Pennsylvania Sugar Company whereby it was to have the use of a large acreage of Everglades muck land northwest of Miami. For this land the Pennsylvania Sugar Company was to pay rent, \$1.85 an acre for the larger portion and \$3.50 an acre for the rest. The Tatum Brothers Company, owner of the land, gave the sugar company the privilege of purchasing the land for \$12 an acre, with the rental to apply on the purchase price, if the experiments in cane cultivation proved successful. The Tatum Brothers Company was under bond to refund the rent if the experiments failed.

About 70,000 acres of muck land were involved in this agreement. This was the first Everglades land which the Tatum Brothers Company had been able to sell or lease at any price. It was hoped that the Pennsylvania Sugar Company project would raise the value of the other lands in the vicinity which were owned by the Tatum Brothers Company, by other private interests and by the state.

In the spring of 1919, while negotiations were under way, General José Miguel Gomez, experienced sugar producer with financial interests in Cuban

sugar mills, inspected the land involved in the proposed development. Upon completion of his tour of the area, Gomez stated that the soil was not sufficiently fertile for the growth of sugar cane. He suggested that land experts, after careful study, might be able to adapt the land to the requirements of sugar cane cultivation. Unless such adjustments were made, he said, the enterprise would be a failure.

Perhaps as a result of this opinion, work was postponed for a time, but later it was resumed despite the warning because it was believed that Gomez might have been prejudiced by his own sugar interests and his possible fear of competition between Cuban and Florida sugar. Certainly Cuban interests did not look with favor upon the development of Florida as a major sugar producing area.

The Pennsylvania Sugar Company, with headquarters in Philadelphia, was well established in the sugar refining industry before it embarked upon its Florida venture. It handled the sugars of E. Atkins & Company, which controlled the largest mills in Cuba, as well as the sugars of the Caledonia Sugar Company, a cooperative association of independent Cuban mill owners. Its refinery in Philadelphia, one of the largest in the country, had a daily output of 7,000 barrels, with a yearly business exceeding \$50,000,000.

While this was the company's first entry into the field of actual sugar cane production, the economic stability and financial strength of the firm gave confidence to persons interested in the development of the Everglades as a sugar producing region. The company offered no stock or bonds for sale. The entire project was self-financed. The importance attached to this fact was indicated by the *Tampa Tribune*. Having learned of the early progress made by the sugar company, the *Tribune* commented, "This story is inspiring and encouraging for two reasons, one being that the Pennsylvania Sugar Company is self-financed and abundantly capitalized and has not a dollar of stock to sell. The second reason is, it has gone about this sugar making business methodically, scientifically, and commonsense-like, from the start . . ." Furthermore, it was considered highly significant that the company asked no concessions from the county, the state or the city.

The company's directorate was composed of wealthy men who were influential in various businesses in Philadelphia and other cities of Pennsylvania. George H. Earle, Jr., was president of the company, and William H. Hoodless was general manager.

Van Alen Harris had been instrumental, along with B. B. Tatum, in securing the company's favorable attention toward the Everglades. Harris was a graduate of Princeton and was an experienced cane grower and sugar manufacturer in the tropics. He had been constructing civil engineer for the Guanica Central Sugar Company of Guanica, Puerto Rico in 1901; superintendent of El Ejemplo Sugar Factory at Humacao, Puerto Rico; general manager of the Central Romana Sugar Company at La Roma, Santo Domingo; and vice-president and general manager of the Haytian-American Sugar Company of Port Au-Prince, Haiti. Harris became the first resident manager of the Pennsylvania Sugar Company in Florida.

Shortly after land arrangements had been made with the Tatum Brothers Company, the Pennsylvania Sugar Company began clearing the land in preparation for actual cane planting. The company was registered to do business in Broward County on November 12, 1919. By May, 1920, approximately 360 acres of Everglades muck land had been plowed and was ready for cane. Between 200 and 300 acres of cane were planted that spring and summer. The labor force of the plantation in 1920 consisted of about 100 men. These men were housed in temporary buildings and were served their meals on a houseboat. Holt, Indiana and Cletrac tractors were used to provide power for preparing the land and cultivating the cane. Also in use on the plantation were twenty mules which were equipped with special muck shoes.

Thus it was that in December of 1920, with almost 300 acres of cane standing high in the fields and all Miami looking forward to the first harvest of sugar, a killing frost struck the area, and the entire planting was lost. The first misfortune had befallen the Pennsylvania Sugar Company's enterprise in the Florida Everglades.

The frost of December, 1920, aroused some doubt in the minds of the management of the Pennsylvania Sugar Company as to the feasibility of growing sugar cane in Florida. It had been the understanding of the company's officials that the weather in South Florida would not become cold enough to damage the cane plantings. The killing frost was completely unexpected and dealt a severe blow to their confidence in the success of the South Florida project.

Consequently, W. H. Hoodless, general manager, sent Ernest R. Graham to Florida to assume the resident managerial duties and to investigate the advisability of continuing cane cultivation. Should he find it unwise to

continue the growth of sugar cane, he was instructed to explore the possibilities of an alternative use for the land held by the company in the Florida Everglades. Graham was a graduate of the Michigan School of Mines. He had had experience as a mining and civil engineer prior to the World War, had served as a captain in the army engineers during the war, had been active in agriculture in Michigan since the war, and had been associated with Hoodless in the beet sugar mill in his home town of Croswell, Michigan.

Immediately upon arrival in Florida, Graham conferred with the weather bureau regarding the possibilities of future frosts in South Florida. R. A. Gray, Miami weatherman, told Graham that frosts would occur everywhere in the state except on the islands in Lake Okeechobee. However, he assured Graham that it would be possible to eliminate the frost danger on the sugar company's land by the use of pumps. Gray said that by pumping water over the fields in time of frost danger, thus blanketing the tender cane, the crops would be afforded ample protection as the periods of frost danger would be brief.

Graham took over as resident manager on March 1, 1921. At that time there were only fourteen employees on the plantation, and all work had come to a halt. The sugar company owned approximately 89,000 acres of land at this time since additional purchases had been made after the original land purchase from the Tatum Brothers Company. This figure included land owned by the company itself and land owned by the executives of the company. The company also possessed a one third interest in about 120,000 acres which extended north to Lake Okeechobee. This interest was later sold.

Of this land between 200 and 300 acres had been plowed and planted in cane. As mentioned previously, virtually all of the original planting had been killed by frost. There were also two experimental plots on which several varieties of cane were being tested for their adaptation to Everglades soil and climate.

It would be well to point out that throughout the entire period of operations it was necessary for the Pennsylvania Sugar Company to conduct continuous and extensive research of a pioneering type. There were few or no textbooks or other authentic printed data concerning the soil and cultivation potentialities of Everglades land. Thus, it was necessary for the inception of the project to employ competent chemists, agriculturists, engineers and soil analysts. Because conditions were unlike any known to sugar production, the methods, processes and tools had to be specifically adapted

to meet the requirements of the unique situation. To conduct this research a tremendous expenditure in both time and money was necessary. The company's tenacity and thoroughness in executing these experiments aroused the interest and admiration of the community. On March 22, 1925, in his feature article on the sugar company, Gerald Brandon, staff writer of the *Miami Daily News*, concluded that, "Pioneering work such as is being done by this corporation entails much vision, faith, patience and expenditure of capital."

Several hundred varieties of cane were experimented with on the plantation. The variations in tonnage per acre and sucrose content were great. An Otahiti variety produced the greatest amount of success of all the types tested. This cane had not been successful in the Hawaiian Islands because of the scarcity of organic matter in the soil. The Everglades soil, with its high organic content, did not suffer from this deficiency. A Japanese cane which thrived in the area also offered possibilities.

Along with the problem of discovering varieties of cane which produced the greatest yields under Everglades climatic and soil conditions was that of combatting diseases and insects. In particular, the sugar company was plagued by mosaic disease and cane borers. An expert, who had had much experience with similar problems in Java, was brought to the plantation. This man devoted his entire time to an attempt to develop varieties of cane which were resistant to the mosaic disease. This is a virus disease of plants characterized by a mottling of the foliage.

The preparation of Everglades soil for the growth of sugar cane was a problem with many facets. In the first place, experience in the cultivation of Everglades muck land had proved that it needed to stand clear of surface water for a period of time if best results were to be obtained. Bacteriological action necessary for the sustenance of plant life is checked by an excess of water. Thus, there was the problem of drainage.

In the second place, there are several recognized stages of development in which Everglades land is found. They are colloquially called the saw grass period, the careless weed period, the elderberry period and the custard apple period because of the type of vegetation found growing. Cane will grow best on the custard apple land which is the highest stage of development. Since most of the land belonging to the sugar company was of the saw grass stage, the operators of the plantation sought ways to develop it.

In the third place, although the soil was rich in nitrogen, it was found to be lacking in phosphoric acid and potash. This problem was easily solved by A. E. Maier, agriculturist in charge of that phase of work. He used a mixture of twelve parts of phosphoric acid and eight parts of potash to fertilize the sugar cane fields. From 500 to 2,000 pounds of fertilizer were used on an acre of land. All of these soil problems had to be met if the company's operations in Florida were to be a success.

The mechanical problems presented by the necessity of plowing, planting cane, and harvesting cane on muck land that was frequently wet and soft called forth a good deal of ingenuity and inventiveness on the part of the operators. Ordinary equipment could not operate in these conditions which meant that specially adapted farm machinery and equipment had to be designed.

C. Clinton Page, in the *Miami Herald* on January 1, 1925, describes some of the new machines and methods used, "Among the special tools used has been an immense gasoline motor propelled plow equipped with three bottoms, each turning a furrow twenty-two inches wide and from twelve to fourteen inches deep. This machine was used for the first plowing of the virgin saw grass land after it had been cleared of the grass, weeds, and minor brush and small trees by burning and dragging. Tractor-drawn disc harrows, drags, and floats were subsequently used to work up and smooth the soil for planting. Tractors by the dozen; in the neighborhood of twenty Fordsons, besides fifteen or more of various other types, including the caterpillars; and dozens of Ford cars and trucks, are a part of the Pennsylvania Sugar Plantation. In order to get over the vast fields quickly when necessary and where there are no hard surfaced roads, Ford cars and trucks have been equipped with special rims and flat steel-faced tires, ten to twelve inches wide, making it possible to traverse, when emergency requires, any part of the plantation, even when the soil is wet and otherwise impassable."

These Fords were stripped down to the chassis and were characterized in another newspaper story as "rough-riding artificial donkeys" which, their comfort notwithstanding, "covered the ground quickly."

Caterpillar tractors were practically necessities because wheel tractors bogged down too easily and became stuck in the moist muck land. Mules and work horses were largely unsatisfactory because the footing was too soft for them to be of much value as a source of power.

Because of higher labor costs per man hour in Florida as contrasted with Cuba and the West Indies, it was necessary for the Pennsylvania Sugar Company to mechanize as much of the planting and harvesting as was possible to compete economically with sugar produced in those areas with cheap labor.

Cutting cane at harvest time entailed much hard work. To eliminate as much hand labor as possible, the company expended large sums of money in an effort to perfect a mechanical cane cutter. To this end engineers who were experienced in the invention of large farm machinery specially designed to meet unusual problems were brought to the plantation. Unfortunately, these efforts were never entirely successful, and it was necessary to continue to cut all of the cane by hand. Negro laborers performed this operation using large cane knives. However, from this point on, getting the cane from the fields to the sugar mill was completely mechanized.

After the cane had been cut, it was loaded on carts or wagons which were drawn by tractors to the railroad which ran through the cane fields. This railroad started at the mill and ran five miles into the cane fields. The company utilized eighty cane cars which were pulled along the rails by Fordson tractor engines mounted on railroad wheels and axles. Mechanical loaders transferred the cane from the field wagons to the railroad cars. These loaders were steel towers about thirty feet high and wide enough to span both the railroad cars and the field wagons. Hoists powered by gasoline engines lifted the cane from the wagons into the railroad cars. Trains of cars were then pulled to the mill where they were unloaded by a mechanical device which tipped them so as to deposit the cane in an automatic feeding trough which carried the cane into the mill.

Despite all attempts to mechanize the production of sugar, the cultivation and harvesting processes, by the very nature of the crop, made a large labor force necessary.

The number of workers employed varied from 100 to 1,000 depending upon the season, the maximum naturally being during the harvest season when all cane was cut by hand. The wage scale for white workers varied from \$100 to \$200 per month plus living quarters. Negro laborers were paid by the hour. According to T. N. Toms, former bookkeeper for the Pennsylvania Sugar Company, the hourly rate increased from 20c in 1923 to 40c in 1925. The employees normally worked a ten hour day, six days a week, or a total of sixty hours a week.



The gross payroll figures for three years were made available to the writer. They are as follows:

1924.....	\$206,000.00
1925.....	173,000.00
1926.....	134,000.00

About one third of each of these figures represented wages paid to Negro labor.

These figures are significant. The downward trend of the payroll indicates the reduction of operations which accompanied the transition from the cultivation of sugar cane to truck farming which will be discussed later. In 1924, sugar cane was the principal crop. The flood in the summer of 1925 killed the cane and led to the cultivation of truck crops. By 1926, the change to truck crops had been completed.

The employees of the plantation and their families comprised a self-sufficient community. Equipped with a store, a church, a dance hall, a post office and a doctor, the community was known as Pennsuco.

The employees were housed in frame buildings constructed on stilts as a protection against high water. Separate units housed the Negroes and the whites. Single men lived in bunk houses and were fed in the company mess hall, while the families were housed in individual units. The living quarters and other buildings were divided among three separate camps.

There were two problems involved in the maintenance of an adequate labor force. First, there was the difficulty of finding and hiring laborers. The Miami area, undergoing boom time development, did not contain persons looking for the type of work to be found at the sugar company's plantation. Therefore, it was necessary to recruit workers from such areas as North Florida and Georgia. The company paid recruiters at a stipulated price per worker.

It was the second problem, however, which created the most headaches for the sugar company officials. The workers from southern rural areas were extremely susceptible to the lure of the high wages and glamour which typified boom time Miami. According to T. N. Toms, "Much recruited labor was brought in one day and left immediately for Miami."

Thus, the maintenance of an adequate labor force constituted an ever-present irritant in the operation of the sugar plantation.

In the spring of 1921, after Ernest R. Graham took charge as resident manager, cane planting was begun again. The officials of the company had decided that the continued cultivation of sugar cane offered the best opportunity for the utilization of their Everglades land. With some 200 men who were brought in from Jacksonville the planting of about 1,000 acres of cane was started.

The first job was that of preparing the land for the planting of the cane. As the land was covered with saw grass, brush and small trees, it was necessary to burn off the native vegetation before attempting to plow the land. At times the saw grass was mowed first to allow it to dry thoroughly before burning. Once the wild plant growth had been removed, the actual plowing of the virgin muck soil could begin.

For this purpose plows such as the three bottom self-propelled plow, described earlier in this paper, and other large plows drawn by large Holt caterpillar type tractors were used. The fields were then disced, harrowed and dragged so as to smooth and level them for planting.

A big, stocky Florida Green cane was the main variety planted. The first cane stands lacked uniformity. There were spots where the cane grew vigorously and rapidly, but in the same fields were spots where the cane was small and stunted. In an effort to determine the reason for the irregular growth, A. E. Maier, soil analyst, sampled the soils of the Everglades from the sugar plantation north to Lake Okeechobee. He discovered that the humus or vegetable matter in the soil was decomposed to a depth of only about six inches in most places. As an experiment Maier dug holes down to the limestone, which was about five or six feet beneath the muck and filled these holes with layers of decomposed top soil and fertilizer. The growth of cane which resulted from a planting in these holes was truly remarkable. An attempt was then made to determine a practical method by which this could be done universally. A plan was devised whereby holes would be dug at eight foot intervals. The topsoil between the holes would be combined with fertilizer and used as filler. The holes were dug by Negro workers who were paid by the hole. As the only requirement was that the holes must be dug to the rock base, the diggers soon developed a fine technique whereby they could skillfully and quickly dig a very narrow hole no bigger than the shovel itself. These, of course, were completed in a very short space of time, but they were worthless insofar as the purpose for which they were designed was concerned. Needless to say, the operators quickly stipulated that the holes be large enough to allow a barrel hoop to

pass down them. The land which was prepared in this way produced large yields of cane.

Some of the land had to be aerated before it could be planted. This was particularly true of land on which little shells were found. These were low forms of sea life which it was necessary to destroy. Muck containing these shells had to be turned up continuously. Fertilizer consisting of twelve parts phosphoric acid and eight parts potash was applied at a rate of about 1,000 pounds to the acre. This fertilizer was used on all the land, and in some sections as much as 2,000 pounds to the acre was spread.

In 1922 Ernest Graham went to St. Louis where he purchased about 200 Angus, Hereford and Durham steers and heifers and two carloads of western broncs. The theory behind the purchase of this stock was that the manure from livestock would benefit the soil. However, rains in 1922 flooded the fields, and it was necessary to dispose of the cattle and horses before their value could be determined.

Still another attempt was made to improve the soil by the planting of leguminous truck crops between the rows of cane. It was hoped that this would both enrich the fields and return a profit. About 100 acres of land were leased to farmers for the growth of truck crops on a 50-50 basis. The company realized a profit of something over \$100 per acre. Thus, it might be called a successful venture in truck farming.

By 1922, about 1500 acres had been planted, but a flood that year prevented the harvesting of the crop. The high water also damaged and destroyed much of the cane. As soon as the high water receded, rehabilitation of the cane fields was begun, with the result that about 1500 acres of cane were available for cutting that winter. During this period the company attained a yield of twenty tons per acre with a ten per cent sugar content.

In the summer of 1925, a flood completely covered the fields of the plantation and killed all of the cane. With this new disaster the Pennsylvania Sugar Company brought to an end its attempts to cultivate sugar cane and turned to the full scale production of truck crops.

Early in 1922, after three years of experience in the Everglades and the expenditure of nearly \$300,000, the officials of the company had been fully convinced of the potentialities of the Florida Everglades as a sugar producing area. Thus, they were willing and determined to construct a sugar mill costing another million and a half dollars. Despite the doubt expressed by some lay critics, construction of the mill was inaugurated in May 1922. By fall, excavations had been completed and most of the concrete foundation

had been laid. At this point heavy rains flooded the area and made continuation of the work difficult. In spite of the handicap, work was pushed on, and the mill was completed in May of 1923.

Prospects of growing sugar cane had not been the sole factor in the decision to construct the mill in the Florida Everglades. In the first place, the site was near enough to Cuba to suggest the possibility of transporting Cuban raw sugar by boat to Miami and by barge up the Miami Canal to the mill to be refined, thus enabling the company to operate the mill throughout most of the year. Cuban sugar laws later prevented this from being attempted. In the second place, Mr. Earle, president of the company, foresaw the future growth of the southeast Florida coast and visualized that area as a large market for refined sugar. A third important factor was the availability of large quantities of limestone which could be used in the manufacture of lime and carbon dioxide which were needed in the refining process.

The mill was constructed of corrugated steel. It was 352 feet long, 192 feet wide and 90 feet high, with a maximum daily capacity of 1500 tons of cane. Reported to have been the finest plant of its kind in the United States and one of the most thoroughly equipped in the world, it included a lime kiln, a refinery, and experimental paper plant.

It was located ten miles west of Hialeah on the southwest bank of the Miami Canal.

Gerald Brandon, staff writer of the *Miami Daily News*, gave the following vivid description of the processing of cane in the mill: "The cane goes through a crusher, thence through the shredder and between three sets of rollers that extract the juice. The fiber or 'bagasse' is then carried to the western end of the mill where it is fed to the furnaces as fuel. This bagasse will be the basis of the paper industry that is planned as a by-product.

"From the rollers, the cane juice passes to storage tanks in the basement and is pumped through filter presses to remove the mud and other foreign solids. It is then treated with lime in a carbonation process that replaces the 'defacation' process commonly used in other mills. From the carbonation tanks it again goes through filter presses and thence to the vacuum pans where it is boiled until crystalization has occurred to a sufficient degree. It is then dropped into the crystalizer where it is kept in motion until the crystals have grown to the desired size. From the crystalizer the sugar, which by this time is in a pasty form, goes to the battery of centrifugals, where the molasses is extracted by the gravity process. After washing and drying, the sugar is sacked. It is then what is now called a high grade raw

sugar. The refining process is practically a repetition of the previous process, the raw sugar being melted in water and the carbonation, boiling, filtering, crystalization and other steps being gone through again. In addition, there is the granulating machine that is used after refining."

A plant crew of one hundred skilled sugar factory men was brought to the plantation in December, 1923, to prepare for the operation of the mill. On January 17, 1924, the engines were started, and the mill was in operation. Because of the limited amount of cane available, the mill operated at a reduced rate for only thirty days. The total production for the season was 2,500 bags of refined sugar and 1,500 bags of raw sugar. President Earle, Secretary-Treasurer J. A. McCarthy and General Manager Hoodless of the Pennsylvania Sugar Company were all present to observe the mill in operation as the first refined sugar manufactured in Florida was produced. That year's operation of the mill was considered by the company's officials as a "tune-up", so they were not overly concerned with the amount of sugar manufactured.

Heavy rains throughout the summer and fall of 1924 meant that little cane was available for grinding during the 1924-25 season of the mill. However, it was reported in the *Miami Daily News* of March 22, 1925, that "despite the fact that the mill is being run at a small percentage of capacity and that the cane had had its sugar content considerably reduced by standing in water over a period of several weeks, the output had paid for the mill operation this season." One of the primary purposes in the operation of the mill was to try out improved machinery which had been installed in the plant, including a number of features which had been designed by the company's own experts.

The mill which represented a mammoth investment in capital and labor operated only two years. May of 1925 brought deluging rains to the Everglades. The resulting high water killed the cane and silenced the engines of the mill.

Prior to the flood of 1925, the main interest and purpose of the Pennsylvania Sugar Company had been the cultivation of sugar cane. However, even before that catastrophe there had been some experimentation with and actual cultivation of other crops. It has already been mentioned that certain truck crops were grown between the rows of cane by independent farmers on a share basis. In addition, from the very beginning of the project, individual employees and the company itself planted and tended vegetable gardens. The produce from these gardens supplied the families' tables and

the company's mess hall. By the winter of 1924-25—the last season of cane production—almost 1,000 acres were devoted to crops other than sugar cane.

While going through the files of the Pennsylvania Sugar Company, it was interesting to note the number of articles and news reports referring to the potentialities of orchids, mangos, mushrooms, pineapples, avocados, tomatoes and other plants which could be grown in South Florida. Apparently the company's officers were considering the possibilities of crops other than sugar as early as 1922. Thus, the change-over from the cultivation of sugar cane to the cultivation of truck crops was more a gradual and premeditated transition to crops which had been successfully grown than a sudden change to the growing of untried crops.

There were two main reasons for the change. In the first place, truck crops require a much shorter growing season than cane. Thus, it was possible to plant the vegetables in the fall, after the flood dangers had passed, and to harvest during the winter and early spring, before the heavy summer rains had begun. The problem of high water which had so hindered the growth of cane was, for this reason, substantially reduced. Secondly, vegetables do not require as fertile soil as sugar cane. It was much less difficult to grow vegetables on the saw grass land than it had been to grow cane.

Other reasons, of course, played a part in the plans which were made for the future of the plantation. To have replaced the cane plantings would have meant the expenditure of a great deal of money without any assurance of a profitable return. By contrast, vegetable crops would cost less to plant and would bring in at least some revenue within a relatively short period of time.

During the winter of 1925-26, approximately 2300 acres of potatoes were grown. From this acreage 14,000 barrels were shipped north in addition to the large amount which was sold on the Miami market. These potatoes brought a higher price than did northern grown potatoes. Between 1925 and 1931, the area devoted to truck crops varied from 500 to 2,000 acres. The variety of vegetables grown was increased in order that the season's success should not hinge upon the fate of a single crop. In 1927, the *Miami Daily News* published the following estimate of crops to be harvested weekly throughout the season:

Potatoes	-----	12,000 crates
Beans	-----	500 hampers
Carrots	-----	20,000 bunches
Spinach	-----	500 hampers
Turnips	-----	6,000 bunches

Beets -----	12,000 bunches
Celery -----	4,000 bunches
Onions -----	10,000 bunches
Eggplant -----	100 crates
Radishes -----	25,000 bunches
Squash -----	100 hampers
Peppers -----	250 hampers
Tomatoes -----	400 crates
Cabbage -----	200 crates

The harvest season was expected to last from about January 1 to May 1, 1928. Many of these vegetables were sold in the Miami area, but large amounts were also shipped to northern markets.

To handle local sales, a warehouse was located in Miami. Benjamin Hunter, experienced wholesale groceryman, was put in charge of this phase of the business. He handled distribution to retail outlets, restaurants and hotels. Every effort was made to assure delivery of high quality, fresh vegetables to these buyers.

The marketing of vegetables shipped north was handled by a northern division of the company. These vegetables were transported by barge down the Miami Canal to refrigerated steamships which carried them to northern ports. Some potatoes were also shipped by rail in carload lots from Miami.

The greatest hazard to the production of these crops was the danger of damage from frost. In order to protect the plants from this natural danger, three large pumps, each with a capacity of 66,000 gallons of water a minute were installed on the plantation. These pumps were used to pump water from the Miami Canal back into the drainage canals and ditches of the plantation until the fields of growing vegetables were covered with water. This blanket of water protected the green plants from the extreme cold. When the frost danger had passed, the pumps were reversed, and the water was drawn back into the Miami Canal. These pumps were also used to help control the water level so that possibilities of floods were somewhat reduced.

From 1928 to 1931, the plantation was operated as the Pennsuco Farming Company. The losses of this company were guaranteed by the Pennsylvania Sugar Company, and Ernest R. Graham remained as manger.

In 1930 a canning factory was put into operation for the purpose of canning surplus potatoes and beans. The canned goods were sold under the trade name of the Pennsuco Farming Company. In 1931, when the low

prices caused by the general farm depression of the late 1920's and early 1930's made it impossible to operate the plantation profitably, the Pennsylvania Sugar Company withdrew from the Everglades.

The real estate boom of the early 1920's in the Miami area caused land values in Dade County to rise so rapidly that 33 of 96 dairies operating in the county in 1924 were forced to go out of business. The resultant decrease in the fresh milk supply alarmed J. S. Rainey, county agent, and others interested in the dairy industry. As a consequence, these individuals sought the provision of additional land for dairy purposes.

With this in mind, the Dade County Dairy Association, at their meeting on May 16, 1925, invited Ernest R. Graham to discuss the possibility of utilizing Everglades land for pasturing dairy cows. In his discussion, Graham said that the Everglades could become a dairy section if roads were provided and if some system of drainage were worked out. Graham further stated, "The Pennsylvania Sugar Company is going to dike off a 425-acre tract and use pumps to drain it during the wet season. If this works out satisfactorily, there is no reason why this method cannot be applied to the drainage of pasture land."

From this meeting came a plan whereby the Pennsylvania Sugar Company would sell five sections of Everglades land, at a price below the market value, to a syndicate, composed of Dade County residents and headed by Marcus Milam, with the understanding that the land was to be used for the establishment of dairy farms. The county was to implement the plan by constructing roads into the proposed area.

This project was received with great enthusiasm. The *Miami Herald* reported that "to Mr. Rainey [county agent], that the portion of the Everglades extending north and south and on westward from Hialeah, by adopting the Hollander's method of keeping back the water, will be a most beautiful section of Florida. He pictures beautiful farm houses surrounded by tropical fruit trees which he declares will grow rapidly with profitable results. The diking system with roads and grass plots would be a most picturesque scene to travellers and sightseers and would prove to be Miami's wonderful back country attraction." An editorial in the *Miami Daily News* commended both the sugar company and the leaders of the project for their initiative and community spirit.

Heavy rains in the late summer of 1925 plus the sudden "bust" of the real estate boom prevented this project from advancing beyond the planning



stage. All the money which the sugar company had received from the land buyers was refunded.

The foregoing discussion of the unfulfilled dairy plan is included here to indicate the way in which the sugar company, through its representatives, entered into the community projects for the development of South Florida.

Throughout the entire period of its operation in the Florida Everglades the Pennsylvania Sugar Company was harassed by the problem of adequate drainage. From the beginning, crops were damaged—and often destroyed—and work was hindered by the heavy summer and fall rains which are so common in that section of the state. Thus, the success of the Pennsylvania Sugar Company's plantation was, to a great extent, dependent upon a satisfactory solution of the drainage problem. As the company's land was a part of the Everglades, so their drainage problem was a part of Everglades drainage.

The Everglades is a broad, flat plain—lying south of Lake Okeechobee for the most part—which covers an area of approximately 4,000 square miles. In this area the average mean rainfall ranges from approximately 60 inches at Miami to 50 inches at Lake Okeechobee. The yearly distribution is uneven so that most of this rain comes in the summer and early fall.

Therefore, the problem of Everglades drainage was to devise a system which would provide for the removal of the great amount of excess water caused by the heavy seasonal rains. As the topography of the Everglades is so flat, with the highest elevation reaching only a few feet above sea level, there was not a great deal of natural drainage. Furthermore, on both sides of the Everglades are ridges which, except for a few natural outlets, did not allow the drainage of flood waters to either the east or west. Most of the natural drainage, consequently, had been southward along the middle of the peninsula emptying into the Gulf of Mexico. Many men dreamed of draining this vast area of land so as to make its fertile soil available for productive purposes.

Since the interests of the Pennsylvania Sugar Company were vitally concerned with the drainage of the Everglades, the executives of the company took an active and vociferous part in all actions undertaken by state and local agencies which affected drainage.

State action toward the reclamation of the Everglades was instigated by Governor N. B. Broward during his administration (1905-9). In 1905 the Everglades Drainage Board was created. In 1913 a graduated system of acreage taxes was provided for the district. Also in 1913, the Florida Ever-

glades Engineering Commission made an investigation culminating in the Randolph report which became the basis of Everglades drainage. The Randolph Plan, which was in effect when the Pennsylvania Sugar Company came to Florida, incorporated a system of diagonal drainage canals from Lake Okeechobee to the Eastern Atlantic seacoast. The Miami Canal, near which the sugar plantation was located, was one of the main canals in the drainage plan.

The officials of the sugar company had been convinced that the completion of these canals would provide adequate drainage for their land. Their first disappointment came when President Earle and General Manager Hoodless visited the plantation in June, 1920. They found that the dredge which was constructing the Miami Canal was not operating. They were also concerned over the water level of the canal and the possible danger of flooding the cane fields. Consequently, they instructed Van Alen Harris, resident manager, to investigate the possibility of damming the canal behind the dredge so that the completed portion of the canal could effectively lower the water level of the area through which it ran.

On June 29, 1920, F. C. Elliot, Chief Drainage Engineer, telegraphed Harris authority to construct the dam in the Miami Canal. This dam was placed near the Dade-Broward county line and aided in protecting the cane fields from floods in the fall of 1920.

In an effort to make more of their land available for use, on January 5, 1921, the company applied to the Chief Drainage Engineer for permission to dig a canal which was to extend from the Miami Canal through their lands to a point approximately six miles west of the Miami Canal. This lateral canal was dug in 1921 and 1922.

Under the authority of F. C. Elliot, a secondary dam was placed in the Miami Canal by the sugar company in early 1923. As a result of rains in October, 1924, a section of land owned by F. M. Brown located on the South New River Canal in Broward County and a second half section, also in Broward County and owned by Brown, were covered by high water. Brown claimed that this flood was caused by the construction and maintenance of the dam in the Miami Canal. Brown brought suit for \$200,000 damages against the Pennsylvania Sugar Company and Ernest Graham. He also brought suit against the Board of Commissioners of the Everglades Drainage District, the Dade Drainage District, the Everglades Construction Company and F. C. Elliot. The suit against the sugar company which was in litigation for several years, was finally settled in favor of the sugar com-

pany on the grounds that the dam had been placed in the canal by the authority of the Everglades Drainage District and that the dam had had little or no effect upon the water on Brown's land.

Despite the favorable verdict, this suit greatly affected the policies of the Pennsylvania Sugar Company. In a letter to F. C. Eliot, H. Edgar Barnes, attorney for the sugar company, stated that the Brown suits, because of their "vast possibilities of hampering vital enterprises by the terrors that they may inspire," should be disposed of so as to permanently determine the authority of the Everglades Drainage District.

The sugar company's officials believed that their difficulties were largely the result of a reluctance on the part of the Drainage Board to assume responsibility for their actions and promises. They hoped that this suit would permanently establish the fact that the Everglades Drainage District had supreme authority in all drainage matters. This hope was not realized.

Because of the Brown suit, the sugar company's plantation henceforth was operated as The Pennsuco Farming Company. This new corporation was formed because of the executives' fear that they might endanger all of the assets of the Pennsylvania Sugar Company by their activities in the Everglades. The officials felt that the actions of the Drainage Board were characterized by indecisiveness and that the responsibility for drainage activities was too vague for any development to be made with assurance and confidence.

Another matter which concerned the Pennsylvania Sugar Company during this period was the construction of the Tamiami Trail. During 1923 and 1924 the construction of the Trail was being pushed westward from Miami. On June 23, 1923, Chief Engineer Elliot stated in a letter to Ernest Graham that the "road acts as a continuous dam across the Everglades preventing the natural flow of water and jeopardizing the lands to the East and Northwest along the Tamiami Trail and Miami Canal." With this observation Graham was in complete agreement.

The tortuous struggle which ensued over the construction of adequate openings in the Tamiami Trail caused the executives of the Pennsylvania Sugar Company to believe that the Everglades Drainage District did not have the necessary authority with regard to drainage matters. They could not understand how any person or governmental unit could be allowed to construct a road which was considered to be an obstruction to natural drainage by the Board of Directors of the Everglades Drainage District.

On the other hand, many persons in Miami believed that the sugar company was attempting to stifle progress in the county. One important fact, however, becomes evident to one who peruses the advertisements and editorials of that period. This is that, regardless of the disagreement about the Tamiami Trail, almost everybody continued to look upon the Pennsylvania Sugar Company as an asset to the community and hoped for its success.

In 1923 the legislature passed a law creating the Dade Drainage District. This new district was formed to provide better drainage of the lands belonging to the Pennsylvania Sugar Company. The flood of 1922 had discouraged the company and had brought about the realization that the drainage was far from adequate. The district included 317 sections or 202,880 acres in Dade and Broward Counties. The Pennsylvania Sugar Company owned approximately 87,640 acres in this drainage district.

For the purposes of taxation the district was zoned according to the benefits received. In 1924 a \$2,756,042.71 project of canals and dikes was undertaken. In 1927 the Dayton Morgan Company made a study of the project and approved the plans as adequate for successful drainage. However the survey report pointed out that the Everglades Drainage laws were so defective that reclamation work would be impossible. The report stated, "They are about the most primitive, unfair and inadequate of all the reclamation laws now in use in America."

Eventually much of the Dade Drainage District project was carried out. The Biscayne and Little River Canals were dug, thus providing two additional outlets. Lateral canals and ditches were dug and levees were constructed.

Obviously, the Pennsylvania Sugar Company carried a large part of the tax burden because of the extent of their holdings in the Dade Drainage District.

Because of the difficulties and obstructions it had encountered, the Pennsylvania Sugar Company, in 1925, inaugurated its own system of dikes and pumps in hope of protecting at least a small portion of its holdings from future flood damage. Dikes were built around 4500 acres, and pumps were installed to control the water level within that area. The larger portion of the company's holdings was temporarily abandoned in an effort to adequately protect a small area.

By this action the sugar company hoped to demonstrate the effectiveness of dikes and pumps and thus prove the economic value of the land.

In 1927 the Pennsylvania Sugar Company sold its sugar mill to the Southern Sugar Company which moved the mill to Clewiston where it is now part of the United States Sugar Company's mill. This was the beginning of the end of the company's operation in South Florida.

By 1927 the Pennsylvania Sugar Company had come to the conclusion that the production of sugar cane was not practical under the existing conditions. There were two main reasons for this decision—inadequate drainage and soil deficiency.

Unquestionably the most important of these was inadequate drainage. From the very beginning, high water had damaged and destroyed the cane crops. The problem of drainage had involved the operators as defendants in a \$200,000 damage suit; it had forced them into the struggle with the county government resulting in litigation over a bond issue; and it had caused them to lose faith in the state officials in charge of Everglades drainage.

Thus it was that on October 21, 1926, President Earle, in a letter to Governor Martin, asked, "Who in the Everglades knows what his rights are? Who knows how to conduct himself to avoid vexatious suits?" He urged, "What you need above all things is a clear definition of rights, that will let us go ahead without fear of consequences. Enterprise cannot exist under a system of gruelling uncertainty." President Earle pointed out the inadequacy of placing the control of drainage matters under an ex-officio board composed of the governor and four cabinet members. As he stated, the public had not merely given these men to the great drainage problem to cope with ". . . it has burdened these five gentlemen with more duties, and difficult duties, than any human beings can perform."

Later, in a letter to Governor Martin and the members of the Board of Commissioners of the Everglades Drainage District on November 15, 1926, President Earle complained of the promises which had been made to the company. He stated that ". . . when we were told that you not only could but were promised that you would give us a sufficient depth of drainage for agriculture, and upon this promise were induced to abandon our plan to leave the Everglades and spent these enormous sums of money, we were told what, if I understand the matter, was an impossibility."

In 1925 the Everglades Drainage District taxes of the Pennsylvania Sugar Company were raised from about \$30,000 a year to about \$120,000 a year in spite of a promise that they would not be raised. This tax load plus the Dade Drainage taxes was too much for the plantation to carry.

With the passage of Governor Martin's Everglades Drainage District Bill in the 1927 legislature most hope for a change of policy was lost. The sugar company believed that the future drainage outlook was dim.

The second cause for the abandonment of the growth of sugar cane was the deficiency of the soil. It took a great deal of effort and expense to prepare the land, and once the land was in cultivation there was considerable shrinkage. This deficiency of the soil, together with inadequate drainage, compelled the officials of the company to abandon sugar cane cultivation.

Actually, the truck farming done by the Pennsylvania Sugar Company was fairly successful. The company, however, was not particularly interested in operating a truck farm since sugar was its main business. Furthermore, the executives did not consider the truck farming project to be large enough to be worthy of the time and energy which would have had to have been devoted to it. Also, the prices received for vegetables in the early 1930's was so low that the vast overhead of the plantation could not be carried.

In 1931 the Pennsylvania Sugar Company withdrew completely from the Florida Everglades.

Graham negotiated with the company for a portion of their land and buildings. He remained to develop a dairy and beef cattle farm on the original Miami Canal site. Many of the sugar company's housing units, the office and the commissary are still used. The old warehouse for the sugar mill is now used to store feed and farm machinery. The frames of the cane cars are hay racks. The lime kiln and pump house are still standing but are not used.

Despite the apparent lack of success of the Pennsylvania Sugar Company in Florida, it was a pioneer in the large scale cultivation of sugar cane in the Everglades. Their experiences contributed to the future successes of sugar cane production in the Florida Everglades.

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