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THE LATE HON. PAUL ISENBERG.

RAW SUGAR REVIEW, 1902.—The only change made in duties during the year has been with the Philippine island sugars, which have been admitted since March 8th, 1902, at the rate of 25% reduction from the Dingley Tariff Bill applying to foreign countries. All foreign sugars have come in during the year on the basis of 1.685c. for 96° test. The amount of sugar imported free of duty has been about 296,000 tons from the Hawaiian Islands and 82,700 tons from Porto Rico. These free importations have had no influence, whatever, upon the price of sugars in the United States, the quantity being small in proportion to the total amount required for consumption. The only influence upon prices, therefore, has been the quantity of supply and the demand for consumption. The supplies of the world having been so much larger than the requirements, say the increased production of 1,294,657 tons, against a normal increase in world's consumption of about 500,000 tons, naturally has made a year of decreasing values during the greater part of the time. This was forecast in our review at the close of 1901, when we said that the year 1902 should show a decreased average from 1901, making two years of downward trend, after three years of upward trend. The review of prices which we now give confirms this opinion. The year 1902 opened with Centrifugals 96° test at 3⅝c. per lb. and the downward trend continued by a steady movement to 3¼c. per lb. June 27th.

During July and August the market remained very steady at about 3⅜c. per lb., but with September an improvement began, refiners generally recognizing the position as being one of changing strength on account of the prospect of a greatly decreased production of beet sugar in Europe and of the extremely low level to which the market had been depressed, much below the cost of production in the island of Cuba and elsewhere. In other words, the pendulum swung too far in the downward direction even for unfavorable conditions and began to swing in the opposite direction, and a steady improvement in prices was made from September to close of the year, when in December 3.94c. was the market quotation for spot Centrifugals of 96° test, with transactions for arrival on the basis of 4c. per lb. The average for the entire year was 3.542c. per lb.—Willett & Gray's Circular.

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"Much uncertainty prevails as to the effect of current prices upon Europe beet sowings next spring. On the basis of roots at 80 pf. equals 16s. per ton, and without making any allowance for interest or amortization, the average cost of production is placed at 8s. With interest and amortization charges added the average cost is estimated at 9s. in the case of newly established factories, and at from 3d. to 6d. less on old established factories, which have written off part of the cost of their buildings, machinery, etc."

The Louisiana Planter's Journal gives an account of a sucessful cane loader, recently invented, which promises to reduce the cost in this branch of the industry. It says: "Records kept on the Waubun Plantation show that the loading of cane by hand was accomplished at a cost of 14 cents per ton, which that of loading with the new machine was but 6.62 cents per ton."

The weather throughout these islands during the past year has been favorable to the growth of our staple product—cane, as also to all other vegetation. Except in a few localities, the occasional showers have been sufficiently abundant with the irrigation supplies. The efforts that are being made by the Washington government to restore forests by replanting are most commendable. But no efforts can result favorably until some effective restrictions are placed on the wild animals—cattle, horses, sheep and goats that roam over the mountains, destroying every vestige of growth. This destruction has been going for many years, and can only be checked by the enactment of such legislation as will prove an effectual remedy. A law allowing any person to kill any animals roaming at large on the government lands—branded or unbranded—is probably the only effectual remedy to cure the evil.

Forest trees of every description grow very rapidly on these islands, when protected from injury by animals roaming at large.

Reference has been made in the local papers to the Algeroba bean as food for horses and cattle. We have used these pods as feed for both horses and cows for the past ten or fifteen years, with the best results, first running the pods through a straw cutter, which cuts them into small pieces, then mixing a pint of ground barley to a pail full of pods—and no better feed can be obtained in the market. They keep animals in the best condition, with no danger from over-eating. The crop of Algeroba beans for the past year has, however, been unusually light, owing probably to the light rain-fall.

The weather for the year past has been all that could be desired, and these islands have fortunately been free from any destructive storms such as have prevailed in former years.

At Last a Hardy Orange.—The Department of Agriculture has for years been trying to produce a new orange that will withstand the cold waves that have devastated the groves of Florida twice in the last decade, as may be seen below: Herbert J. Webber of the department is now ready to announce that he has developed an orange that can be grown 200 miles further north than the varieties hitherto commonly grown in Florida. He has accomplished this by crossing the Japanese trifoliate orange, an ornamental tree, with the com-

mon varieties successively until a fine fruit capable of enduring extreme cold has been produced.—New York Times.

Negro Labor.—The proposal to introduce negroes from the Southern States into these islands as laborers, has been advocated abroad, and it is possible that some Congressmen may favor such an experiment. Thirty thousand have been proposed as a starter, but it is doubtful whether Congress will sanction such a wild scheme. It has, however, taken action against the introduction of Asiatics as contract laborers. If negroes are ever sent here from the Sourthern States to colonize as laborers, it would be mainly from the idle and vicious class, without families or means to purchase homesteads, or to enable them to become quiet and industrious citizens. No one who knows anything about plantation laborers of the South, will ever consent to such a plan being adopted. While it may be true that they are becoming a redundant and restless population, owing to their fecundity, Hawaii will never tolerate any scheme that aims at colonizing them here. Our native Hawaiians are a different race entirely, and are capable of becoming assimilated in all the branches of modern civilization with Anglo-Saxons; but, with the negroes as a class—never.

We call the attention of planters to the article headed "Probale Deterioration of the sugar cane plantation. While our sugar lands are less liable to deterioration from over-cropping, than those of Louisiana, still it is well to remember that lands, as well as animals require rest and frequent fertilization. Sugar lands are capable of being made unproductive and comparatively worthless by neglect of proper fertilization, and on the other hand they can be improved and rendered more productive by the application of such fertilizers as are required. While most of our sugar lands are comparatively new, yet the constant cropping of them without the application of fertilizers will soon show the result of neglect, in decreasing crops. The suggestion made in the article referred to, of changing from lower to higher lands, or changing the seed, has been practiced here with good results, though the first crop on new land does not always give the returns expected.

LOOKING BACKWARD.

It is well sometimes, even in the busiest days of life, to stop and recall a few of the incidents that occurred here in former years, that led to present conditions and the prosperity enjoyed by Hawaii, in common with the mother country, to which we are now so closely allied. A little more than fifty years ago, a small band of ten or fifteen men met in the lecture room of the Bethel chapel on King street opposite

the present store of C. Achi, to confer as to whether it were possible to successfully organize and maintain a society to encourage and assist those who might desire to engage in the manufacture of sugar, the importation of live stock and the development of industrial pursuits in Hawaii. At that time there were comparatively few foreigners residing here, scattered over the group. The gold excitement in California attracted many from the Eastern States and Europe to the Pacific coast, and very naturally some came to these islands seeking employment, and engaged in various pursuits, making this their home, as was the case with the writer of these lines, editor of the Planter's Monthly. The need of co-operation was soon felt, and a public invitation was issued for a meeting to confer as to the best mode of taking action in the matter.

A preliminary meeting was called by a notice in the Polynesian newspaper of April 27, 1850, in which the object was stated, and those interested were invited to attend. At this meeting Judge Andrews presided, and several speakers urged that a society should be organized to carry out the views of those present. It may not be amiss to give the names of some of those who were present and spoke. Messrs. Stephen Reynolds, William L. Lee, Dr. Newcomb, Dr. R. W. Wood, S. N. Castle, Josiah Fuller, H. M. Whitney, E. Johnson, R. C. Wylie, R. Armstrong, C. R. Bishop, Benj. Pitman, Thos. Brown, F. Wundenburg, A. B. Bates, L. L. Torbert, Godfrey, Rhodes, Geo. M. Robertson. But of all the pioneers mentioned above as among the early and active organizers of the Agricultural Society of 1850, the writer of these lines is believed to be the only one now living, so far as he can recall.

At the first meeting for organizing of this infant society, held in Honolulu, August 15-18, 1850, Judge William L. Lee delivered an address, from which we quote a few paragraphs:

ADDRESS DELIVERED BY WM. L. LEE, ESQ.

"This is no common gathering. In a small Island of the Pacific, which thirty years ago was buried in the darkness of heathenism and scarcely known to the most civilized portions of the earth, in a country whose uplands were then slumbering in the almost unbroken rest of ages, and whose lowlands knew little culture but that of the kalo patch, there has this day assembled the planter who counts his hundreds of acres of sugar cane and coffee trees—the farmer raising cargoes of vegetables for California,—and the herdsman who gathers in his folds a thousand cattle. Indeed this is no every day assemblage. Who in the days of the distinguished discoverer of these islands,—of the great and good Vancouver, or in the still later times of the arrival of the American Missionaries on these then savage shores, would have dared to predict that in the year of our Lord one thousand eight hundred and fifty, there would gather in these ends of the earth, from

Europe and from Asia—from North and South America—from Old England and from New England, such a body as we now see! Who at that time would have staked his reputation on such a prophesy? Verily, my friends, I hail this assemblage with joy! I hail it, if it prove successful in the objects for which we have come together, as the dawn of a new era in the history of the Sandwich Islands. I hail it as an advancing step towards the thorough civilization of the Hawaiian race and the security of its national prosperity and independence. An advancing step, I say; for great as is the contrast presented to us between the present and thirty years ago, in the view we have just taken, I venture to predict that those who shall fill our places thirty years hence, will see a far greater one between that time and the year 1850. They will see our valleys blooming with coffee and fruit trees—our barren hill-sides waving with luxuriant cane fields—our worthless plains irrigated and fruitful, and the grass huts now scattered over our land replaced by comfortable farm houses. This is the day of small things in the agriculture of the Hawaiian Islands, but by no means is it a day to be despised. Let us improve it by doing a work not to be forgotten when we are gone. By forming an institution to be perpetuated by its blessings, and for which the generations to come will remember us with gratitude.

"The necessity for the formation of an Agricultural Association in these Islands is too obvious to need more than a word. The cultivators of the soil, scattered as they are from Kau to Waioli, points, which owing to the slow and uncertain movements of our inter-island navigation, are more distant from each other than England and the United States, with little or no opportunity of communicating with each other, live bound to their fields, in ignorance of their co-workers on other islands—in ignorance of each others advantages and their best sympathies dwarfed and dormant. This is clearly wrong, and there exists an imperative necessity for reform. The agricultural interests of this group stand pre-eminent in importance, and its Representatives should at least meet once a year to aid in their promotion. To prosper, the farmers of this Kingdom need what they have never had, namely, an organization. One which shall bring them acquainted with each other's improvements, and means of procuring, securing and economising labor. One which shall give them a community of feeling—a singleness of purpose, and concert of action. One which shall serve as a head—a *well regulated* head, by which their operations may be guided, and through which they may speak as with the voice of one man. To supply these wants, is one of the great objects of the proposed association. It has other objects not less important, among which, are the promotion of friendly and social intercourse,—the mutual bestowment of assistance and the interchange of kind offices,—the awkening of a spirit of industry and fru-

gality; and the diffusion of light and knowledge throughout the Islands in relation to every branch of agriculture. Nor is this the end of benefits expected to flow from this association. It is intended by the judicious distribution of premiums, to arouse the people to a laudable ambition in the growth of finer and larger crops, the introduction of new seeds, plants, and better agricultural implements, the importation of new breeds of cattle and the improvements of those we have, and the discovery of some means for the effectual destruciton of the various insects and vermin which at certain seasons of the year sweep over portions of the group like the locusts of Egypt, destroying every green thing.

"Of all the occupations of man, agriculture stands first in importance and second to none in dignity. I would not follow the error so common with public speakers, of attaching undue importance to the subject under consideration, but I do feel, that in the assertion I have just made, I am upheld by the universal voice of history, of the ablest writers on political economy, and the observation of every day life. Agriculture is the original source of all wealth and prosperity. It supplies our food and raiment. It gives us life, health and strength. Its productions furnish the materials for the labors of the manufacturer, and in turn freight the bark of commerce. In a word, it is the basis of all other arts—the great substratum upon which rests every other interest, individual and national. It is the most ancient and most sacred of all employments. We read in the Holy Scriptures, "And the Lord God planted a garden eastward in Eden: and there he put the man whom he had formed." "And the Lord God took the man, and put him into the garden of Eden, *to dress it and to keep it.* After the fall of Adam, we read, "The Lord God sent him forth from the garden of Eden, *to till the ground from whence he was taken.*" It is clear then, from the highest of all authority, the Bible itself, that the great Creator made man a farmer; and that all other avocations are secondary in rank to that of agriculture. Being the first labor commanded of Heaven it is the most dignified, honorable and important. Its seniority and divine origin entitle it not only to our reverence and respect, but to our highest consideration among the arts, of which it is the common parent.

From the day of Adam to the present time the culture of the soil has held its high position in every civilized country. Among the Israelites it stood first in rank, with the Persians it was rewarded with royal favor, and among the Chinese, the most populous, one of the most ancient and in many respects the most civilized of the nations of the globe, it has ever commanded alike the adoration of the "Sole Guardian of the Earth," and his four hundred millions of subjects. The annual ceremonial by which the emperor of China manifests his respect for agriculture, is probably familiar to you all. Surrounded by his principal officers, he prostrates himself upon

the earth, and invokes the blessing of the God of Heaven upon the labors of himself and of his people. As the high priest of the Empire, he then sacrifices a bullock, and while the alter is still smoking, he lays aside his imperial robes, puts his hands to the plough, and opens several furrows over the whole field. After the Mandarins have followed his example, presents are distributed to the peasantry, and the festivities close, to be again renewed when the Emperor comes to sow the seed. A noble tribute this to one of the noblest pursuits of man! In no country, perhaps, is the agriculture of a nation so strikingly illustrated. Its crowded population, which has little or no other source of substance, has pushed it to the highest state of perfection, and necessity, ever fertile in invention, has furnished it with means of inducing and perpetuating the fertility of the earth, which to the most enlightened agriculturists of the present day is a matter of astonishment. Not a rod of ground that can be made to produce the the most unimportant crop is suffered to run to waste. The steepest hill-sides and most precipitous mountains are cut into terraces and cultivated to their beds—carried to commanding heights, and made to trickle down their barren sides to beautify, enrich, and bless the earth. There alone in all the globe the soil is never let to rest. From age to age not an acre of its five millions of square miles is permitted to lie idle, and the same land which for thousands of years has been yielding from two to three crops annually, is by a judicious system of manuring made to retain its pristine vigor.

The revenue of China, which is estimated at upwards of $150,000,000, consists chiefly in productions of the soil; and well may Agriculture be honored, in a land where she takes up its dusty atoms, transmutes them into her powerful alembic, and pours them into its treasury, a stream of moulten phon.

In Egypt, once the very centre of civilization, and even in its ruins the land of wonder to the philosopher and endless research to the scholar, agriculture was an object of special devotion. In such estimation was it held by the Egyptians that they described its invention to the Gods, defined the Nile as the fertilizer of their soil; and worshipped the ox for his services in the field. Though Egypt has ever been for the most part an arid waste covered with burning sands, yet the overflowings of the Nile, united with the industry of her inhabitants, earned for her the reputation of being the granary of the world. Even in her present desolation, her Copts and Arabs supply their Turkish masters with grain.

In Greece, agriculture was never cherished to the same extent that it was among the other great nations of ancient times. This was partly owing to the sterility of her soil, and in part, no doubt, to her prosecuting the labors of the husbandman by means of slaves. Still it was honored by the poetic

genius of Heriod, and by the writings and lectures of Xenophen.

"Rome venerated the plow, and her noblest sons followed in its furrows. Her pride, her strength, her wealth and chief glory lay in her agriculture; and from the time of Numa, when to neglect the cultivation of a farm was an offense punishable by the chastisement of the censor, to the decline of the Emperor, her senators and magistrates, her most distinguished statesmen and generals, were often found tilling the soil with their own hands. Farmers filled the ranks of her invincible legions, and to this fact it is probably owing, that wherever Rome carried conquest, instead of burning and devastating the vanquished countries, she caused them to smile with the peaceful fruits of the husbandman. The Roman Eagle was almost the sure omen of victory, but upon his wings was borne the promise of human advancement and prosperity. Good roads were made; property protected; the products of the soil increased; towns and cities built; and the conquered provinces were made to teem with a beauty and luxuriance scarcely second to that of Italy herself. Even at the present day there is no country that exhibits such a diversity of culture as Italy, and none, except it be China or Flanders, that exceeds it in fertility. Weak, distracted and despised as Italy now is, she preserves in the character of her agriculture, a faint ray of the glory of that splendid empire of which she was once the centre.

"In Carthage, the illustrious rival of Rome, the cultivation of the soil was one of the chief subjects of attention. Agriculture was the principal source of her revenues; and her great generals thought it not beneath their dignity to make themselves master of all its rules, both by study and by practice. Such was the esteem in which agriculture was held by the ancients. For nearly four thousand years it was the fountain of life and power to the most renowned and civilized nations of olden times.

"Through the dark ages agriculture languished. The labors of the husbandman were swept away with the torrent of blood and carnage that followed in the train of the Goth and Vandal, and died amid the desolation of provinces, the groans of slaughtered millions, and the shock of falling empire. There was no incentive for the farmer to sow and plant, for he felt no certainty that the harvest would not be gathered by some new invader. With the revival of letters and the bursting forth of that pure flame of civil and religious liberty which shone with such glory in the Reformation, Agriculture, in common with the other arts, awakened from her long slumber, and again took up her march of joy and gladness to the depressed and starving nations. From this time, the art of improving the soil advanced slowly but surely, yet it can hardly be said to have retained the height it oc-

cupied in the days of the Romans until the middle of the eighteenth century. (Continued on Page 45.

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LINKED TO THE MAINLAND.

In common with all living here on these Hawaiian Islands, we feel an honest pride in the completion of the ocean telegraph cable, which now binds Hawaii to America in a closer bond than before, though it consists only of copper wires, which, though they may break, can be replaced, or reunited, as is frequently done on the Atlantic side. Regarding the necessity of a cable an American Exchange said, a few months since: "Look at the Hawaiian Islands, their position is unique. They extend over several hundred miles of longitude in the middle of the ocean. There is no land within twenty-one hundred miles in any direction. They constitute a civilized people with a high class government; and yet they are entirely cut off from telegraphic communication; they are nearly a week away from the rest of the civilized world. There is no other example of a civilized community in such isolation. A Hawaiian cable was a necessity years ago, and has been urged on Congress at different times. These islands have a new and increased importance, as forming a link in the great trans-Pacific route between the United States and the Philippines and China and Japan. Formerly a message was sent from Washington to the Phillipines by mail via London, requiring fourteen transmissions, and making a circuit of a large part of the earth. Washington wishing to communicate with Manila sent its message to New York by land; thence to Valentia, Ireland, by cable; from Ireland to Brighton, England, by cable and land; thence to Havre, France, by cable; from there to Marseilles by land. Then it crossed the Mediterrean by cable to Alexandria, Egypt; from there it travels overland to Suez, then was repeated to Aden, Arabia. It made another dive under the Indian Ocean to Bombay, and was flashed overland to Madras; thence by water again to Singapore, by the Malayan Peninsular cable; then by cable to Cochin China; thence by cable to Hong Kong, and Manila by cable, having traveled fourteen thousand miles, and been transmitted fourteen times. Practically ninety per cent. of the money paid for this transmission was paid to foreign telegraph and cable companies. It is evident that the cost of communication to the Philippines will be greatly reduced.

Whether considered as an agent of diplomacy or of commerce, as an adjunct of our military service to guard us from sudden attack, as an auxiliary to the weather bureau to announce approaching storms, as a protection to the public health advising of plagues or pestilence, or as an important ally to the Isthmus Canal, the Pacific cable is of the greatest importance and should be under the control of the United States Government.

The greatest ocean depth ever sounded was discovered by the U. S. Cable ship Nero. The depth of soundings was 5,260 fathoms, or 31,560 feet. This extreme depth of water was found over a considerable space, which the Nero sounded round in an endeavor to map out a route for the cable. It would be impossible to lay cable over this part of the ocean and steam round it. At this point in the great Pacific there appears to be a deep valley in the ocean bed. The Nero's soundings went 260 fathoms farther below the surface than any have ever gone before. They have established a new record of ocean depths that will be of great interest to geologists and scientists generally, and as both the Atlantic and Pacific oceans have now been surveyed a great deal, it is not unlikely that Lieutenant Hodge's record will stand as the limit of ocean sounding for some time.

Other recent Pacific expeditions have found remarkably deep water, Admiral Belknap making soundings that showed much greater depth than has ever been found in the Atlantic. In the Challenger expedition by the British government the maximum depth found in the Atlantic was 27,366 feet, in the Pacific 30,000, in the Indian 18,582 and in the Arctic 9,000. The Nero's record is 1560 feet deeper than any of these. Lieutenant Hodges named the wonder "Nero Hole," after the steamer Nero. Its bottom is farther below the surface than the peak of the highest mountain in North or South America or Europe is above it; and only one mountain in the world has height to match its depth.

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THE ROOT ROT OF TARO.

By T. F. Sedgwick,

Agriculturist, Hawaii Agricultural Experiment Station.

History of Taro.—Taro, botanically known as *Colocasia antiquorum esculentum*, is a perennial plant, 1 to 2 feet high, with heart-shaped, peltate leaves and large fleshy rootstocks, from which the poi of the Hawaiians is made. In Japan, China, Porto Rico and elsewhere the tubers are cooked and used like Irish potatoes and the young tender leaves are used as a pot-herb. It is one of the principal food products, not only of the native Hawaiian, but of many of the native races of the Orient.

According to DeCandolle the taro plant is a native of India, from which country it was transported first to Ceylon, Sumatra, the Malay Archipelago and Egypt, and more recently to the Fiji Islands and New Zealand. From New Zealand it undoubtedly accompanied the present native Hawaiian race in its migration to Samoa, Tahiti, and finally to these Islands.

The plant has been in cultivation so long that there are many cultural varieties, differing from one another in size,

maturity, form and habit of growth, and especially in the coloring of the flesh of the swollen root or corm, the portion of the plant which is mainly used for food, and the varieties resulting from cultivation have become so fixed, that they now have nearly the same value as separate species.

In Hawaii there are two distinct individual strains of taro, the one with red or pink flesh and the other white. Of each of these strains there are many sub-varieties or forms, each with native names. A list of such varieties is given in "Thrum's Annual for 1888," enumerating twenty-eight in all. Later lists give as high as forty-five separate forms or strains known to the Hawaiian people.

In its habit of growth and the character of the root, the Japanese taro is entirely different from the varieties cultivated under irrigation in Hawaii. The Chinese taro, or the variety commonly grown by the Chinese, is cultivated because it matures in a short season, but it appears to be more subject to rot than some others.

Taro holds about fourth place among the products of Hawaii, at least in area of land devoted to its cultivation and probably also in total value of crop. The investment in taro growing approximates from $450,000 to $500,00. It is practically all consumed in Hawaii, the export of taro flour or "Taroena," amounting to but a very small percentage of the total crop.

Taro cultivation is exceedingly profitable, and land suited to its cultivation, provided it has water rights, brings a high annual rental. The average rental per acre in the vicinity of Honolulu for taro land ranges from $40 to $50. The average retail price of poi in Honolulu ranges from 2½ to 5 cents per pound. One acre will generally produce from twelve to fifteen tons, which sells for from $1.75 to $2.50 per hundred pounds. Land taro, or taro grown without irrigation, makes excellent poi and does not seem as readily affected with the root rot as that grown under irrigation.

The land suitable for the cultivation of the water taro, the variety which is principally grown, is a rich, deep, muck soil, bordering the streams, or occupying the lowest portions of the valleys extending back into the mountains. Land to be capable of growing taro must have an abundant supply of running water, and it needs also to be very rich. Many of the taro fields now in cultivation have been planted in taro, with hardly any rest, for one hundred years or more. The old Hawaiians understood the needs of occasional fertilizing and often allowed their patches to go without a crop for one season. They also planted certain weeds or burrs in the taro patches, and spaded under the growth, thus not only giving the patch a rest, but adding a considerable amount of organic matter to the soil.

The available irrigated taro land is about all occupied. The

opening up of new areas for its cultivation would be dependent, either more careful use of the water now available.

Although taro has been the staple food of the Hawaiians, it is probable that the demands for it and its products will decrease rather than increase as time goes by. Taro and its products while relished by many of the older white settlers of these islands does not meet with the same favor among the newer population, so the probabilities are that the time will come within the next one or two generations when a large share of the taro lands now in cultivation will be planted to other crops.

Usual Method of Culture.—Taro is cultivated in patches of varying size. Each patch is surrounded by a dyke containing openings admitting water and allowing its exit. These patches are usually extremely irregular and depend on the contour of the land both as to size and shape. A valley containing one or two square miles will have, perhaps, two or three hundred taro patches or fields, and hardly two of these will be exactly alike in size or shape.

Before planting the taro the water is allowed to drain off the fields; the ground is then dug up, or plowed with a rice plow, and is fertilized with the leaves, stems and trimmings in the previous crop. In this way the taro rot is perhaps often transferred to new fields, through the use of the trimmings of diseased plants as fertilizer. Occasionally stable manure is used, or rarely, a complete fertilizer. These are thoroughly mixed with the soil.

Taro is propagated by means of the crown of the plant with its accompanying leaf stalks. At the time the crop is harvested, the upper portion of the root is cut off with a knife, then the leaves themselves are cut off leaving about six inches of leaf stalk on the crown of the root. These tops, called "hules," are either planted in a circle around a little mound of dirt, or in rows across the field. They are usually placed about one foot apart. As soon as the patch is planted water is again turned on, but only enough is used to keep the hules moist until the roots start. The patch is not flooded.

In about a month after the hule has been planted the roots start, and the crown throws out new leaves. The period of maturity varies according to the variety, ranging from twelve to fourteen months or more, from the time the hule is set in the ground.

Cultivation consists in keeping the patch clear of weeds and the soil between the roots is sometimes stirred with pick or shovel, care being taken not to loosen the roots.

The fleshly root or corm does not commence to form until about eight to ten months after the hule is planted. Until this time the corm is tapering, like a small carrot; but as soon as the crop commences to mature, that is between the

eighth and twelfth months, the corm rapidly swells and becomes oval or rounded.

It is customary to keep a constant stream of water passing over the patch, or where there is a shortage of water to change it at frequent intervals.

TARO ROT.—The lowland taro, or that which is grown entirely under irrigation, suffers a great deal from a disease known as "taro rot." This rot has assumed such proportions that many taro growers have been compelled to give up the cultivation of this crop and use their lands for rice, bananas or other crops. In the vicinity of Honolulu, it is estimated that this rot, in average years, causes a loss of half the crop. Certain districts are apparently free from the disease, but it has been reported from all of the Islands of the group.

The disease appears to be of two forms, one of which is due to soil conditions or lack of drainage. The other is of a fungus or bacterial nature and is due in part at least to the patches when the plants are about two months old, usually making its appearance on small or poorly nourished hules, or on those which are improperly planted. The disease is entirely local. It may occur in one patch while another patch on the other side of the dyke may be free from it, or it may occur in the middle or one corner of a patch and not in the other and the maturity of the hule. Hules cut from plants which have not matured fully are rather more likely to be diseased than those from fully ripened plants. The rot is also apparently somewhat dependent upon the state of cultivation of the soil, or its drainage. The center of a taro patch is usually the lowest and the most poorly drained, and very often the disease occurs in the center of the patch while the taro all around the margin is apparently healthy or only slightly diseased. The disease, which causes a rotting of the corm, apparently starts from the lower end and works up through the middle of the root. The root either becomes hollow at the age of four or five months, or if not infected until later, the entire lower portion of the corm becomes rotten.

Diseased plants may be readily distinguished from healthy ones by the form and general appearance of the leaves. The whole plant becomes stunted, the leaf stalks are shortened, the leaf blades become curled or crinkled, and instead of being a deep healthy green are yellowish and spotted. If such a plant is cut across with a knife the bundles or fibres in the root will be found to be blackened, and these black fibres can be sometimes traced into the base of the leaf stalks.

When the rot attacks the hule shortly after planting, it causes a rapid maturity; the corm instead of remaining conical in shape up to eight or ten months, changes to a spherical or oval shape at four or five months growth, and unless soon harvested becomes completely rotten.

It is the practice among the Chinese taro growers, and also to some extent among the native Hawaiians, to rotate the

hules. The land and the crop are held to be too valuable to waste any time between the crops in allowing a rest. It has come to be the practice for a grower to take the hules from one patch and plant them on another patch, the idea being to change the seed. All of the hules are used, that is, no choice is made in the selection and if a crop is harvested before maturity from an infected field, hules undoubtedly bearing the germs of the disease are again used for seed.

The disease is rapidly spread by the use of these diseased hules, the passage of laborers from one patch to another, or the transfer of the dirt itself from one patch to another; and perhaps also to a limited extent in the irrigation water, as the taro patches are arranged in the terrace system, and the water which has irrigated the higher fields is used over and over again through the whole series.

The losses throughout the Hawaiian Islands due to the disease amounts to at least $70,000 per annum, and the disease seems to be on the increase.

The high rental values of the lands, and present methods of cultivation of taro, work against the adoption of rational methods of combating the rot. With a crop which requires from twelve to fourteen months for its complete maturity, the cultivator feels that he must have something growing on the soil during the entire term of the lease, and a crop of taro is no more than harvested before another is planted, sometimes not more than three or four days intervening between the harvesting of the crop and the replanting of the hules.

Taro soils are generally marshy and as they are kept constantly submerged they are sour or acid. Sour soils in general are inimical to the growth of many varieties of cultivated plants, but taro, being a native of swampy regions is well adapted to cultivation on such lands. Marshy or muck soils, such as are used for this crop, are extremely rich and are capable of the continuous production of very large crops, but to do this they must be given proper treatment.

Swampy land or lands constantly flooded with water are usually deficient in potash and lime. Potash, phosphoric acid, lime and nitrogen, and a number of other elements such as iron, magnesium, sulphur, etc., are essential to plant growth. When they are present in abundance in the soil, plant growth occurs with the greatest rapidity. When one or more of these elements is lacking, growth is slow or the plant fails to develop properly, that is, it may have a one-sided growth. It may make leaves at the expense of root, or root at the expense of seed, or vice versa.

Sour soils which contain an excess of organic acids, may be corrected or sweetened in two ways. The natural way is to stir the soil and open it up so that the air and sunlight can act upon it. This process is going on in nature wherever soils are in progress of formation but like most natural processes, it is slow. The cultivator, and especially the man

who has paid $50 an acre annual rental for land, cannot afford to adopt this method, and so to improve the land and render it less acid, artificial fertilizers must be used. The best of these for correcting soil acidity, or sweetening the land, is lime. There is a proverb that "Lime makes rich fathers and poor sons," that is, the liming of lands rapidly exhausts them unless the process is carried on in a rational way. The dressing of lime should not be applied oftener than once in five years. Lime not only corrects any sourness of the soil, and sour soils are very prevalent, but it improves the physical condition and makes the potash, phosphoric acid and nitrogen in them more available. Many fungus and bacterial diseases of plants develop at least a portion of their life in the soil and are dependent for their growth on the sourness or sweetness of the soil. Some diseased plants develop more rapidly where lime is present. Others are entirely prevented from developing by the presence of lime.

These taro soils being acid, and having been in cultivation so long as to be almost depleted of soluble plant food, the best method of combating the taro rot, which suggested itself, was to sweeten the soil by the use of lime, and also to add a fertilizer. A well fed plant is like a well fed animal, more likely to escape disease. Plants having a steady supply of food from the time growth commences, often become resistant to disease. The taro crop is of sufficient value to warrant the use of lime and high grade fertilizers.

Experiments on the Control of Taro Rot.—It having been considered desirable to inaugurate experiments for the prevention or control of the taro rot, the use of a taro patch at Kalihi was secured. This taro patch contains about one-tenth of an acre. Work was begun on it in August, 1901. The previous crop had been almost an entire failure by reason of the root rot. The soil was put in proper condition, that is, it was dug up and five barrels of lime, slacked and mixed with the leaves and root cuttings from the previous taro crop, were turned under. Hules were chosen from plants which had been seriously affected with the taro rot.

At the time of planting there was a shortage of water and none was applied for one month; the plants were therefore slow in starting, but when well started they grew finely and showed very little sign of rot. The leaves in this plat had a better color than those in the adjoining plats.

Record of the Investigations.—Notes and careful observations were taken throughout the whole experiment, beginning August 12, 1901, and closing September 15, 1902. The appearance of the rot was first recorded on December 23, four months after planting. From this date a study of the development of the disease was made. The rapidity with which it spread, and the apparent sources of contagion were noted.

Fertilizers were applied at such times as the plants seemed to need them. The action of the fertilizer was noted after

each application, and at the same time a comparison of the conditions of the plants in the experimental plat was made with those of the surrounding patches. Notes on the distinguishing characteristics of diseased plants were taken.

Observations were made on the methods of irrigation to determine how they could be improved upon, first, in the economy of water, second in securing uniformity in the use of water, and third to prevent stagnant water accumulating in the patches.

SUGGESTED IMPROVEMENTS IN METHODS OF CULTURE.

IRRIGATION AND PREPARATION FOR PLANTING.—Much depends upon the proper irrigation of taro. The methods commonly employed are neither economical nor judicious. It is a common practice to let the water enter at one end of the patch and drain out again through a ditch cut in the same side of the dyke but at the opposite corner. Where this system is used one side of the patch receives abundant irrigation and complete drainage, while the water stagnates on fully two-thirds of it. Since taro grows naturally along running streams, an attempt should be made to reproduce natural conditions in the taro patch. If water is let in at one corner of the field, it would be better to have the exit diagonally across from it, and it would be even better to have more than one entrance and exit through the dyke. Furthermore, the area to be irrigated should be more carefully surveyed according to the contour of the land.

The plat of ground used for the experiments here reported, as well as most of the adjoining ones, was laid out without reference to the best use of the water or to complete drainage. One corner of the experimental plat was so much lower than the outlet that it was impossible to secure a circulation of the water and the drainage of that portion of the plat. The surface of the patch was covered with knolls and hollows. To remedy this state of affairs new outlets and inlets were made in the experimental plat, and should be made in other plats which are not arranged to make the best use of the water. This change in the experimental plat was made on February 5. From that date up to the maturity of the crop it was apparent that the taro grown where the water was constantly changing was the best. That which grew in stagnant water made little progress. The deep, undrained corner of the plat became the seat of all disease, and the plants never showed as strong growth there as in the more favored portions. A field which is kept constantly covered with water cannot be properly drained, and as has been previously stated, wherever soils are undrained they become acid, giving some of the rots and other diseases a better chance for development.

The method of permitting water to circulate is more economical than the method in common practice and were it fol-

lowed at least one-fourth more land could be put under cultivation.

After the crop is ripe and has been removed from the land, the soil should be dug or plowed and left to dry out for a month. It can then be puddled and planted. The hules should not be covered with water for at least a week after planting, and should be left without water longer than that if they continue to look healthy. When lime is added to the soil, the dressing should be applied immediately after removing the crop. The soil should then be thouroughly mixed and left bare of a crop for at least a month.

FERTILIZERS.—Most of the fields now used for water-taro have been in cultivation for many years, and many of them have not received fertilization for a very long period.

The fact has been established, with other cultivated crops, that plants grown upon depleted soils are more subject to disease than those grown on newlands, or on soils which have been heavily fertilized.

The taro plant feeds heavily on phosphoric acid and potash, and removes large amounts of the elements from the soil. If the potash and phosphoric acid removed from the field are not again returned to it, the conditions for the development and spread of the taro rot are excellent.

The basis of the experiment reported in this bulletin was *to get the soil of this particular taro patch, which had been cultivated to this one crop continuously for twenty years, into normal condition.* If the fertilizer could have been applied before the crop was planted, a very much smaller amount would have been sufficient, but the Station not having complete control of the land, it was not practicable to carry out the work in the best or most economical manner. In practice it would be too expensive to use as much fertilizer as was applied in this instance. In any commercial fertilizer containing either phosphoric acid or potash, not all of these two elements are in a soluble or available condition. The experimental field having been covered with water at the time the fertilizers were applied, a considerable portion of what which was applied was probably lost in the drainage water. It was noticed that the effect of the fertilizer was apparent in two or three patches lying below the one where the experiment was in progress.

The taro plant does not absorb fertilizers from the water except through its roots, and as its roots are in the soil beneath the main body of water, even though a large amount of soluble fertilizer is added to the irrigation water, only a comparatively small portion will be absorbed by the mud at the bottom of the patch and in turn be taken up by the roots.

The fertilizer should be applied before the crop is planted. Whenever it is considered necessary to add fertilizer during the growth of the crop, the water should be drained off, the fertilizer worked into the mud between the rows, and the

land allowed to stand without water for at least twenty-four hours.

Lime was applied to the experimental plat at the rate of four tons per acre. In practice one and a half to two tons would be sufficient, and this amount only once in five years. Lime not only has the property of counteracting soil acidity, but it also sets free some of the elements of the soil and in this way is an indirect fertilizer. If lime is thoroughly mixed with the soil, it would be better if the land could be allowed to remain free of vegetation for a month after the application before planting the hules. While lime makes some elements more soluble, it also makes others insoluble. This is especially true in regard to phosphoric acid.

Owing to the constantly running water in the patches, it is not wise to apply fertilizers after the plants have been set out, except during the first two or three months of their growth, which is the only period during which water can safely be drained off from the patch for a few days.

After the eighth month, the water must never be drained off the field for any reason. If it is, rot will set in at once.

The best form of nitrogen for taro is apparently ammonium sulphate, but sodium nitrate may be used. Both are very readily soluble in water and are therefore easy of application.

The following table gives the dates on which fertilizers were applied in the experiments reported above, and also the amounts used:

FERTILIZERS APPLIED TO TARO.

Date	Fertilizer Applied	Amount per Acre	Fertilizing Constituents.
Aug. 12	Lime.....	4 tons	
Oct. 22	Bone Meal.....	750 lbs.	Phos. acid 11 percent soluble. " " 11 " insoluble. Ammonia 4 "
Jan. 28	Nitrate of Soda.....	250 "	
Feb. 11	Complete Fertilizer	500 "	Phosphoric acid 10 percent. Ammonia 6 " Potash 8 "
Feb. 11	Nitrate of Soda.....	250 "	Phosphoric acid 8 "
Apr. 18	Complete Fertilizer	500 "	Ammonia 7 "
June 6	Nitrate of Soda.....	400 "	Potash 6 "

In practice once in every five years, from one and one-half to two tons of lime per acre should be applied immediately after the crop is harvested, and at least one month before another is planted. It should be dug into the soil and thoroughly incorporated with it. Just before the hules are planted, the ground should be again dug up or plowed, and a complete fertilizer similar in composition to that used on the experimental plat on February 11, that is, a fertilizer containing large amounts of available phosphoric acid and potash, with a moderate amount of nitrogen.

Nitrogen is the most expensive plant food. It is the most

readily utilized by the plant, and is also most easily lost. It would not, therefore, be advisable to add any considerable amount of nitrogen at this period before growth has commenced. Any considerable application of nitrate of soda or amonium sulphate, which would be thrown away if applied before the hules are planted.

As it appears that the field can safely be drained during the first three months of the growth of the taro, it would be well to apply some form of nitrogen, say six weeks or two months after the hules are planted, first draining the water off the field and thoroughly incorporating the fertilizer in the mud of the taro patch between the rows. From 160 to 180 lbs. nitrate of soda has been found to be the limit which can be safely applied at one time for most crops.

To recapitulate: The proper method of fertilization would be, first, lime immediately after harvesting the crop; then a complete fertilizer containing from eight to twelve percent phosphoric acid, six to eight percent potash, and three to six percent ammonia should be incorporated in the soil before the hules are planted. Then to force growth about 160 lbs. per acre of nitrate of soda should be applied from two to three months after the hules are planted, the water having first been turned off so that the nitrate can be worked into the soil and placed where it can be used by the growing plants. Nitrogen is the only fertilizer which can be added with good effect during the growth of the crop. The lime should be slacked before it is applied.

SUMMARY.

Plants affected with the rot are easily distinguished in the field, either by the stunted appearance of the plant, or by the unusual bluish green or yellowish color of the leaves. The lower portion of the corm and the fine feeding-roots which anchor the corm in the soil, are rotted away, and if an effort is made to pull up the plant it comes very readily.

The first diseased plants in the experimental plat were found four months after planting, but in some of the adjoining plats not under supervision, the rot appeared at two months. The first hules found to be diseased were small and very badly developed, and were found to have been cut with very little of the mother taro left, or i nplanting they were bent or not put in deep enough, or else they were found in stagnant water. By comparing the experimental plat with the adjoining ones it could be readily seen that the fertilizer retarded maturity. That is, taro grown where no fertilizer had been applied, had a tendency not only to contract the disease, but also to mature in a very much shorter season. Some of the adjoining plats which were not fertilized, had to be harvested six months before the proper time, because of the prevalence of the rot. These facts indicate that proper fertilization at the right time, is one of the chief remedies or preventatives of taro rot.

Practical experiments have shown that taro grows best if the hules are planted on virgin soil. In most patches, the taro grown on the margin of the field is the best, especially that which is next to the dyke, the soil of which the dyke is formed probably containing more plant food than the mud at the bottom of the patch. There is also usually better drainage immediately adjacent to the dyke than in the center of the field.

It has been observed that where taro is planted on virgin soil, or on land which has either been allowed to rest for three or four months, or has been planted in rice or some other crop, the plants will remain healthy for several seasons. The growing of rice on taro land is an effective remedy for taro rot, giving comparative immunity for two or three years, but the liming of the soil will be found to be more practicable.

Observations made during the past season indicate that the disease is carried only to a limited extent by the irrigation water. The experimental plat was comparatively free from disease this year, although during the previous season it had been seriously infected. The next plat below was this year badly attacked by the rot, but the second plat into which the water drained was comparatively free from it. This local infection demonstrates, that although the soil may be thoroughly impregnated with the disease, yet the plants, if they are primarily, healthy, will resist rot to a greater degree than if primarily weak.

The hules used in the experimental plat were chosen from plants badly infected with the rot, and the fact that a number of plants with rotten roots were found within the first six months, would indicate how the disease is spread.

The conditions in the experimental plat previous to the beginning of the experiment were the worst that could possibly be obtained in that locality. The crop harvested in 1901 was very badly diseased, and the hules from this crop were used in the experiment, but with all these adverse conditions, the yield from the experimental plat has been greater than in any similar area in the Kalihi District, being at the rate of 16 tons to the acre. This is much above the average.

In the experimental plat the disease appeared first on the hules which were small and weakly, many of which had been planted. A diseased plant matures sooner than a healthy one, and may have healthy looking leaves, but they are mostly dwarfed and more or less distorted. The root will develop and take on the form of an apparently matured root six months before it should do so. The taro root rot is apparently a local disease. A single diseased plant may be found among many healthy ones, or there may be a limited area in which every plant is infected.

The disease attacks the plant in two ways, and seems to present two stages of development. In one case the taro

root rots from the tip. The decay gradually extends upward until the whole corm becomes a soft decayed mass. A root infected with this soft rot has a peculiar characteristic fetid odor, something like decayed fish. The other form of the disease apparently has its source in the center of the corm, or near the lower end, and the effect is to produce a hard, brown core. This may be an entirely distinct disease from that commonly known as root rot.

A diseased slip will grow better on virgin soil, or soil which has been planted to other crops, than on old taro soil. Harvesting taro before its maturity has a tendency to induce disease. The planting of one variety year after year on the same patch, tends to a deterioration of the crop. The development of the rot seems favored by allowing the water to become stagnant, the taro growing best in running water. In irrigating the taro patches the water should be made to circulate over the entire plat. The usual method is to admit the water at one corner of the patch, and to have the outlet on the same side at the other corner. As a result the water stagnates over two-thirds of the field.

Hules which have no eyes are often planted. These are slow to start and are more liable to become diseased. Plants growing on soil which has not been sufficiently dug up and cultivated, produce poor taro.

In applying fertilizer to a taro soil, it should be done before the taro is planted, and thoroughly mixed with the soil. The field should then remain unplanted for as long a period as possible and be again cultivated before the hules are planted.

Fertilizers promote the growth both of diseased and healthy plants. Where there was an excess of lime in certain spots, a few plants were corroded by it, but there was no disease.

Nitrogen, in the form of ammonium sulphate or of sodium nitrate is the only fertilizer which can be profitably applied to taro while it is growing.

CONCLUSIONS.

The conditions necessary to secure a good crop of taro, are:

(1) A supply of good hules, free from disease.

(2(A patch so laid out as to secure the most economical use of the irrigation water.

(3) The application of proper fertilizers, at the right time.

(4) A constantly running stream of water circulating over the fields, or when this is not possible, a frequent change of water.

(5) An occasional change in the variety of the taro planted.

(6) An entire change of hules from one patch to another, or a rotation of crops, using taro land for rice or bananas, at least two years in every five.

The Sugar Market.—Willett & Gray in their latest report state:—" We may say that present quotation for Centrifugals compares with a year ago at 3 21-32c., showing a gain for the year of 9-32c. per lb., the lowest point having been touched at 3¾c. on June 27th, 1902, and the whole tone and tendency of the sugar world being towards a higher range of prices in 1903. The reciprocity treaty with Cuba remains in the hands of the Senate Committee, over the holidays, but should receive prompt action thereafter, and come into effect during January, as we have reason to believe that the opposition to its passage in the Senate grows less and less from day to day, and will eventually disappear, with only a show of opposition."

Czarnikow's latest report say:—"The fate of the Cuban Treaty, after the reassembling of Congress on 5th January, is considered as somewhat uncertain. A convention of beet sugar growers is to be held in Washington next month, February, and it is said that the question of opposition to the Cuban Treaty will depend mainly upon the result of their deliberations. It is thought highly probable that they will not oppose the moderate concession given Cuba by the Treaty, but should they do so they will have the assistance of the high protectionists who fear any tampering with the Dingley tariff.

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AGRICULTURAL INDUSTRY IN THE UNITED STATES.

In his annual report, the Secretary of Agriculture says, It is doubtful if the magnitude attained by American farming interests is generally known. The recent census reveals the fact that the fixed capital of agriculture, comprising value of amounted in 1900 to about $20,000,000,000, or four times the fixed capital invested in manufactures. During that year there were nearly 5,740,00 farms in the United States, covering an area of 841,000,000 acres, of which 415,000,000 acres consisted of improved land. These farms had a value of $16,675,000, exclusive of farming implements and live stock. He says, as indicating the importance of agriculture in the United States, it is a striking fact that about 40,000,000, or more than half the total population in 1900, resided on farms. Of the 20,000,000 persons comprising the portion of population engaged in gainful occupations, about 10,000,000 or more than one-third, were employed in agricultural pursuits. The people that work upon the farm outnumber by more than 3,000,000 persons those who are occupied in manufacturing and mechanical pursuits. In 1890, according to the census returns, the product of the American agriculture, including farm animals and other products, had an annual aggregate of nearly $5,000,000,000. Some of the crop values that make up this total were almost startling in their size. The crop of Indian corn, which

formed the leading item, had a value of $828,000,000. The hay and forage were worth $484,000,000. Wheat, which ranks next to corn among our cereal crops, gave a return of $370,000,000, while oats were produced to the value of $217,000,000. Cotton, the great crop of the Southern States, was valued at $324,000,000.

As a result of the intelligent application of improved methods of American agriculture the product of the farm is enabling the American farmer to increase the annual export every year. The products of agriculture form about two-thirds of the entire export trade. Last year the exports from the farm amounted to about $860,000,000.

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PROBABLE DETERIORATION OF THE CANE PLANT.

In a recent number of your journal I read with interest a letter under the heading of "Probable Deterioration of the Cane Plant," which will perhaps be accorded less attention than it deserves. One of its principal conclusions is the necessity of "change of seed" in cane cultivation. This is a question referred to incidentally in one of my later letters in which I cite an incidental evidence of its truth which goes as far in proof as a single experiment can, as it gave its own confirmation on both sides. In an inter-change of seed between plantations about two miles apart, with apparently similar soil, where the borrowed seed on each estate was used to complete a field being planted, each in the new soil gave a result not only superior to that of the home seed, but also far better than was obtained on the land where it originated. I began many years ago to suggest this improvement, led thereto by observations made upon several old worn out sugar estates, that had been planted with seed cane derived continuously from their own soil thirty or forty years. I noticed that on these plantations a few years before they were finally abandoned, a rapid decadence of the cane fields commenced, a falling off that seemed to be far greater than could be fairly attributed to the gradual pauperization of the soil, and I began to look about for some concurrent cause that might explain the inconsistency. None of these plantations were under my control and I could therefore only make casual observations. I suggested an extended use of the cow pea (and even obtained seed for one of them) supplemented by lime in some form, as this constituent, with humus, are first exhausted in the kind of soil being treated. The manager could not realize the importance of the cow pea, but the owner had one new field planted with a well-prepared fertilizer and stable manure, which should have given a very favorable result. The improvement was not, however, more than half of that which was to have been expected, and I attributed this result to defective seed. This opinion was confirmed later by a planting without fertilization, of another sort of cane.

I suggested, of course, that a trial should be made with cane from another plantation, fertilizating it properly, but a fall in the price of sugar led to the final abandonment of the estate before this could be affected. My experience induces the belief that not infrequently good fertilizers that were adequate to the needs of the soil where they were tried, have change of seed cane.

Some years ago many estates were abandoned in the Island of Porto Rico, from what was supposed to be a disease of the cane. A commission was named and a report published, which was kindly sent me. In reviewing it I endeavored to show that on these isolated estates where the same seed had been planted for a very long period, the defect could be remedied by a change of cane and a subsequent system of proper fertilization. If this had been done when the trouble first made itself more clearly apparent, these plantations might have been saved. If I am not misinformed, the correctness of my opinion has since been verified.

I imagine that in Louisiana it would be advisable to put this question of change of seed to a test, by planting seed cane from sandy land in that which is more argilaceous and the reverse. I would even go further and procure cane from hilly sections to experiment further south.

In Hawaii an exchange from the lower to the higher levels might be advantageous, as it is to be supposed that climatic influences have their full share in this interesting problem. These tentative experiments can be made at so little expense and trouble by putting in a few rows of different seed at the time of planting any field, that as a mere matter of curiosity they seem to be worth while.—Cor. La. Sugar Planter.

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PROVISIONAL METHOD FOR THE DETERMINATION OF EXTRACTION.

At the first meeting of the Hawaiian Sugar Chemists' Association held November 24th, 1902, it was the unanimous opinion of those present that the time was too short to formulate for use during the coming crop methods of analysis which the Association would care to stamp as "official." It was thought, however, that since the greatest differences would be found in the method of determining extraction, this being as well the particular item about which there was the most dissatisfaction, some method for this branch of the work should be recommended as "provisional."

To this end, your Executive Committee sent to each member engaged in mill work a series of questions, the answers to which it was believed would bring out the details of the different methods. Quite complete reports were received from nearly all to whom the questions were sent, and, as was expected, it was found that no two methods were exactly alike. That the task which your committee found before it was a difficult one anyone who has had the opportunity of reviewing the methods in use here, can readily realize.

The method recommended is not the method of any one chemist, and naturally while it approaches nearly to some of the methods in use, it differs widely from others. The method, while in a sense a compromise, is one which your committee believes will give fairly accurate results if carried out as directed.

That the method will be criticised is to be expected, in fact criticism is desired; but your committee would suggest that it will further the interests of the Association if criticism by members be made direct to the committee through the Secretary, and that criticism accompanied by figures will carry more weight than that based merely on theoretical considerations however plausible.

The essential points in the method recommended are as follows:

Basis of Calculation.—The amount of sucrose coming to the mill in the cane is to be used as the basis of calculation; and this amount should be taken as the sum of the sucrose in the properly weighed "mixed juice" and the sucrose in the bagasse.

Extraction.—By extraction is meant the percentage of sucrose in the cane which is obtained in the mixed juice. When the term extraction is used in any other sense it should be so defined.

Normal Juice.—Normal juice is, for the purpose of this method, defined as the juice from the first mill, or the juice from the first mill and crusher where a crusher is in use.

Cane.—Fibre only is to be determined in the cane; and samples should be taken at least twice a week. Samples should be taken by cutting equal lengths from the top, middle and bottom, cutting midway between joints, and this portion divided into two equal parts by splitting, one part being taken for analysis. The sample should be so taken that the portion reserved for analysis is between 200 and 300 grams.

The whole sample of cane is *first* weighed, then finely cut and treated with cold water for two hours changing the water every half hour; or if preferred placing the sample in a linen bag and treating with cold running water for the same length of time. It is then to be digested with water at 60 to 70°C. for one hour, changing the water every 15 minutes, then with boiling water for one hour, changing every 15 minutes, and dried to constant weight at 100°C.

Juice.—Juice samples should be taken continuously by some automatic sampling device, and run into a container in which has been placed a small quantity of either mercuric chloride or formalin. The density should be taken with a Brix spindle with thermometer, and correction made for temperature. Before taking the density the juice should be freed from air, particles of trash removed from the top, and sand or dirt allowed to settle.

For the determination of sucrose the juice may be either weighed, or measured, using 100c.c. or double the normal

weight as measured in a sucrose pipette. No more sub-acetate of lead should be used than is sufficient to effect clarification. Bone black should not be used. Juice samples should be analysed every six hours.

BAGASSE.—Bagasse should be sampled at the carrier, the whole amount from one slat being taken, well mixed, and a portion placed in a closed container. The sample should be finely cut as rapidly as possible and the normal weight extracted with alcohol in a Soxhlet extraction apparatus until the alcohol shows no more sucrose when tested with a-napthol. The residue dried to constant weight at 100°C. is weighed as fibre. Bagasse samples should be taken four times each day and each sample analysed separately.

SUCROSE IN CANE.—The sucrose in the cane determined by the formula

$$\frac{\text{Per cent sucrose in normal juice} \times f}{100} = \text{Per cent sucrose in cane}$$

where f is a variable factor depending on the amount of fibre in the cane and the extraction on the weight of the cane by the first mill or the first mill and crusher from which the normal juice is obtained.

The factors are found in the following table where F is the fibre in the cane and E extraction on the weight of cane by the first mill or first mill and crusher.

E	9.5	10	10.5	11	11.5	12	12.5	13	13.5	F
60	83.15	83.00	82.85	82.65	82.45	82.25	82.15	82.05	81.95	
61	83.40	83.30	83.05	82.90	82.70	82.55	82.45	82.35	82.25	
62	83.70	83.60	83.30	83.20	83.00	82.85	82 75	82.65	82 55	
63	84.00	83.80	83.60	83.50	83.30	83.15	83.05	82.95	82.85	
64	84.25	84.10	83.90	83 80	83.60	83 45	83.35	83.25	83.15	
65	84.55	84.40	84.20	84.00	83.85	83.75	83.65	83.55	83.45	
66	84.75	84.60	84.45	84.30	84.15	84 05	83.95	83.85	83.75	
67	85.05	84.90	84.75	84.60	84.45	84.35	84.30	84.10	84.00	
68	85.40	85.20	85.05	84.90	84.75	84.60	84.45	84.30	84.20	
69	85.70	85.50	85.35	85.20	85.05	84.90	84.75	84.60	84 50	
70	85.95	85.70	85.60	85.50	85.35	85.20	85.05	84 90	84.80	
71	86.15	86.00	85.90	85.80	85.65	85.50	85.35	85.20	85.10	
72	86.45	86.30	86.20	86.10	85.95	85.80	85.65	85.50	85.40	
73	86.70	86.55	86.40	86.40	86.25	86.10	85.95	85.80	85.70	
74	87.00	86..85	86.65	86.70	86.55	86.40	86.25	86 10	86.00	
75	87.30	87.15	86.90	87.00	86.85	86.70	86.55	86.40	86.30	

This table is based on that of Prisen Geerligs published by him in the "Archie, voorde Java—suikerindustrie." The table as published included extraction from 65 to 73 and fibre up to 12.5, and this has been enlarged as given above to meet requirements of the work here.

The extraction E is found by determining the fibre in the bagasse from the first mill, and from the known fibre in the cane, making the calculation, e.g.

Fibre in cane=11%.

Fibre in bagasse 1st mill=33%.

$$\frac{11 \times 100}{33} = 33.3.$$

100—33.3=66.7 extraction on weight of cane, from which the factor in this instance is found to be 84.6.

A slight variation in the extraction will be found to have but slight effect on the per cent of sucrose as thus calculated, and the extraction will need to be determined only when there is a change in the cane or set or speed of mill.

EXTRACTION.—Having determined the per cent sucrose in the cane, the per cent sucrose in bagasse per 100 cane is determined using the results of analysis of cane and bagasse, and the extraction calculated in the usual manner.

An example is given below:

	Brix.	Sucrose.	Purity.	Fibre.
Normal Juice	18.00	16.00	88.9	....
Mixed Juice	15.60	13.60	87.5	....
Cane.	.....	.....	....	11.0
Bagasse.	.....	4.0	....	48.0

Extraction on weight of cane by first mill found to be 66.7 giving factor 84.6.

$$\text{Per cent sucrose in cane} = \frac{16.0 \times 84.6}{100} = 13.53$$

$$\text{Sucrose in bagasse per 100 cane} = \frac{4 \times 11}{48.0} = 13.53$$

$$\text{Sucrose extracted per 100 cane} = 13.53 - 0.92 = 12.61$$

$$\text{Extraction} = \frac{12.61 \times 100}{13.53} = 93.2\%$$

Where the cane is not weighed or where the weights are not accurate enough to be used, the weight of cane can be calculated from the known weight and sucrose content of the juice and the per cent sucrose in the cane.

With regard to weighing the juice, the committee is of the opinion that weighing is the only method that will do away with doubts and differences about the amount of sucrose entering the boiling house; and that the juice should be weighed

on ordinary scales, an equipment of two scales and two tanks being necessary.

As few mills will be so equipped for the coming crop,members are expected to apply this method using the weight of juice as obtained by automatic weights or measuring tanks as the case may be, keeping in mind however that the equipment of the mill with proper weighing apparatus is necessary for accurate work.

Signed for the Executive Committee,

C. F. ECKART,
J. C. PENNY,
P. A. G. MESSCHAERT,
A. FRIES,
EDMUND C. SHOREY.

Honolulu, December 16th, 1902.

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The nitrogen content is essentially connected with the amount of humus in the soil. If the nitrogen is low, the humus is also proportionately low. In all your soils, with one exception, the humus is below the average that should be found in red volcanic soils. This is due originally to the relatively small rainfall. It is a factor, however, which claims our special attention in the treatment of the soils. With the existing practice in the field of burning off the trash, all the nitrogen and all the organic or humus-forming matters are blown off into the air and lost to the soils that are already poor in them. I have most urgently to repeat every word that has already been put before the Isis cane farmers. Bear in mind that the analyses are not personal opinions. They are exact findings in the laboratory, and mercilessly exact; and these findings are endorsing all that I have already said.

Before formulating a fertilizer mixture suitable for your soils, and the cultivation and treatment that should go with the fertilizer, I will call attention to the soils that are exceptions to the general rule in your district in the matter of the content of lime and other elements. When I visited Queensland two years ago, and also since my location in the State, I have repeatedly stated that the cutting down of the wood on the hill slopes, and putting those slopes into cane would turn out a mistake. The soils on these hillsides are naturally very thin, and, after clearing, a few heavy rains soon wash out the elements and leave them sterile. In the three exceptions of "poor, exhausted," hillside soils examined in the laboratory, the lime found is less than one-third of the amount found in the good level lands, and the potash is also specially low. Nothing more needs to be said in these cases. It was a mistake to clear those hills and slopes, and not only because the soils soon become exhausted and sterile, but also because the forest cover upon those elevations has a special effect upon the local rainfall and temperature of great advantage.

In the South Isis, where the lands are much more broken up

into hills and hollows, more examples will be found of sterile soils. One of my junior assistants, who does all soil sampling, has just gone over the South Isis lands, taking many samples, which will be duly analyzed, and exact data obtained.

From the foregoing it is seen that any manures used on the North Isis soils must be used chiefly for the nitrogen and potash they contain, for these are the elements required. Of manures poor in those elements and rich in phosphates, I have to repeat what was said to a Mackay Farmers' Association—"for the cane crop in your soils such manures are not worth the freights upon them from Sydney."

I advise you to use an artificial manure of such a mixture, and in such quantity as will provide 50 lbs. of nitrogen and 75 lbs. of potash to the acre. Two hundred and fifty pounds of sulphate of ammonia will give you 50 lbs. of nitrogen per acre. Also, 500 lbs. of meat works stuff, containing 10 per cent of nitrogen, will furnish 50 lbs. of nitrogen to the acre. I mention these several materials in order that a choice can be made according to the market price, and convenience of obtaining them. The nitrogen in sulphate of ammonia is pretty constant (20 per cent), but in meat works manure it can vary from 2 per cent or 3 per cent to 12 per cent or 14 per cent of nitrogen, which must be known by purchasers, since the value of the stuff depends chiefly on the nitrogen it contains.

To supply 75 lbs. of potash to the acre, 150 lbs. of sulphate of potash must be used. In fact, 500 lbs. of meat works manure containing 10 per cent of nitrogen, mixed with 150 lbs. of sulphate of potash, or muriate of potash, will furnish just what the analyses state your soils require. Of course, a less quantity of this mixture to the acre can be used if the farmer thinks the prices comes too high.

I must call your attention, however, to the urgent advice I gave in February in Childers, in the matter of deeper plowing and subsoiling. Without deep and thorough preparation of the land before planting and also of the ratoon stoles after the previous crop is taken off, manures cannot give their best results. Moreover, deep cultivation is absolutely necessary in order to enable the soil to retain moisture, which is a first consideration. As I told you, if I had to choose between poor plowing with manures, and deep, thorough plowing and cultivation and no manure, I should select the latter; but the combination of the right cultivation with the right manures, with a reasonable rainfall, will give the maximum of results.

I also must again urge upon you to try to get all the trash buried in the ground. As we have seen "burning off" destroyed all the nitrogen and humus, the very materials that your soils are demanding. In addition, and as far as seasons and circumstances will help you, I urge you to try for green crops (beans or peas—say the Mauritius or velvet beans, the cowpea, or the lupines), and plow in whatever you can get to grow. I am testing twelve varieties of green crops at the

Mackay station now, and the results will be to hand in time. In brief, I have to once more urge the combination of deep thorough cultivation with the use of the manures (if you use any) that the analyses have told us your soils require; and may the heavens come to our aid with seasonable rains once more. I have, &c. WALTER MAXWELL.

Dr. Maxwell was then questioned further as to the experimental stations. He said the examination and analysis of soils had gone on splendidly, and were advanced farther than he had expected the work to be at this stage, and as a matter of fact, the soils in the district of Mackay, and the greatest part of the more northern districts had been sampled, and very largely analyzed. Already no fewer than 300 samples, representing soils taken from 1,500 different fields had been analyzed, or rather, an analysis of them would be completed in three or four months' time. Just now one of his junior chemists was out in the Bundaberg district, which district included the locality from Bundaberg to the New South Wales border, and he was sampling the soils and getting them ready for thorough examination. "It is not necessary to say to you," continued Dr. Maxwell, "that we cannot attend to every locality at once, but that we have to take them according to the order of convenience and of necessity. However, to put the thing shortly, the work has gone on splendidly, and this is the more striking because all my young chemists had really to be trained before we could trust their work. My chief chemist is a first-rate man. He is a great worker, and is thoroughly acquainted with the work, and with the special methods that I am using, and he has an excellent knack of dealing with the young assistants, who have to be, as I have said, trained for the work. My junior assistants, in fact every man in the employ of the sugar experimental stations, excepting my first assistant chemists are all Australians, and I make it a great point, as far as possible, to train up young men of the country for the work, since, in doing so, we add just so many well-equipped men to the good of the State, as they will remain in the country. All the assistants have given great satisfaction."

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AUSTRALIA AND HER PROBLEMS.

By Sir Edmund Barton, P.C., K.C., M.A.

[Sir Edmund Barton, Premier of the Australian Commonwealth, also minister of its external affairs, passed through New York on his way home from the coronation recently. He is a large man with darkly florid, clean shaven, powerful face and quick, dark eyes. He has an accent that sounds English, but his accessibility, directness, simplicity, frankness, wide sympathies, energy and good-humored optimism impressed people here as giving him a strong resemblance to the best among our own public men. Though only fifty-three years

of age Sir Edmund looks much younger. For a long time he has been a great force in Australian public life. He was born in Sydney, New South Wales, and got his education in the public schools there and in Sydney University, from which he graduated in 1879. Soon afterward he entered the legislative assembly of New South Wales and was Speaker of that body from 1883 to 1887. He was Attorney-General of New South Wales in 1889 and also in 1891. When the movement for federation began Sir Edmund threw himself into it with his accustomed vigor and was the leader of the Federal Convention in 1897-98. He is an ardent protectionist and fully expects that policy to triumph in his country, where, he holds, it is at present necessary in order to build up industries. [The following account of the first steps of the new Australian Commonwealth along the path of federation is from an interview with him.—Editor.]

Australian federation has been in operation more than a year now, and so far has run smoothly, though not without some grumbling from those who declare that the Federal Government is interfering with the powers and privileges of the six States that constitute the Federation—Queensland, New South Wales, Victoria, South Australia, West Australia and Tasmania.

The principal complaint has come from Queensland in regard to the law recently passed to prevent the importation of Kanaka laborers to work on the sugar plantations there. The answer to that complaint is that Kanaka cheap labor is not healthy for Australia and is passing away.

In framing the tariff bill now up for passage we have provided for a duty of £6 a ton on cane sugar and £10 a ton on beet sugar with an excise of £3 per ton on locally refined sugar, which is reduced to £1, where the refined sugar is the product of white labor. This has had such an effect on the sugar men that at the time I left Australia, six months ago, 1,400 out of the 2,600 and odd sugar properties there had registered for the use of white labor entirely. It is true that such registrations from the extreme north are few, but the total number is larger than was expected and the situation on the whole is very satisfactory.

In other quarters there are in Australia complaints that the Federal Government is assuming more than its constitutional power and is grinding down the States. But there is no truth in that, and no force behind it. It is simply the usual State rights growling such as has often been heard in America. The powers and privileges of the Australian general government are all defined by the written constitution—which is working well—and are similar to those of the general government of the United States.

Those powers are over affairs which in their essence are national, or in regard to which the balance of convenience

favors regulation by the general government, such as tariff, defense, shipping, patents, trade-marks, copyright, post office, telegraph and telephone, lighthouses, census statistics, marriage and divorce, currency, banking, etc. Telegraph and telephone systems in Australia are managed by the general government, while the railroads are run by the States in which they operate. So far the results of this have been very good, and the evils which some expected would result from a great increase of the number of Government and States employes have not appeared. There has been no attempt on the part of these men who practically all exercise the suffrage, to combine and capture State and National Governments and manage them in their own interest.

The great question now agitating Australia is in regard to the tariff. The Senate, which has only the power of suggestion and request, has by a narrow majority made a large number of requests for reduction of duties which general sentiment considers necessary for the upbuilding of our young industries. Ours is a young country, and is passing through the same phase of industrial development that Canada entered upon twenty-five years ago when Sir John A. MacDonald made his campaign for protection there and put the industries of that country on their feet. Our industries and the labor they employ need similar aid at this time, and the tariff law which has been framed and is now in process of passage only provides for protection to those Australian industries which are natural to the country and substantial.

In comparison with the tariff of the United States the protection given to Australian industries by the bill now before our houses is quite small. The highest range of duties is only 30 per cent., and the average—omitting duties on opium and spirits—not more than 15 per cent. Of course the high freight rates afford additional protection.

The prospect is that the bill will pass as drawn or with little amendment. It is a Government measure, and has the general support of the House of Representatives which has declined to grant most of the Senate's requests.

The Senate of Australia is constituted the same as the Senate of the United States, and therefore does not always accurately reflect popular feeling. Each state, large or small, has six representatives; thus giving Tasmania, with only 180,000 population, as much voice in the Senate as New South Wales with 1,600,000. There is no dissatisfaction with this arrangement. Our people believe that equal representation in the States is better for Federation than representation based on population would be.

But this has produced a Senate which certainly in this instance does not represent the sentiment of Australia in regard to the tariff. There is an abnormal number of free traders in it who are mostly from the smaller States and whose presence is due to exceptional circumstances. They are wielding power

derived from accident, and the next election will probably result in a change.

Protection sentiment is growing in Australia. It is becoming more and more widely recognized that the time has arrived when we should cease to depend on other nations for goods that we can easily and profitably make for ourselves. New South Wales, from which I came, has been free trade, but is progressing toward protection.

Our farmers are protectionists as a body because their farms are mostly situated far back in the interior, physical difficulties have prevented or obstructed railroad building, and land carriage is arduous and costly, while the bulk of population is gathered in and around the seaboard cities and without protection would get most of its agricultural produce from over seas.

Another great problem with which we are struggling is that of irrigation, and a joint irrigation scheme is afoot for using the waters of the Murray, our greatest river, to fertilize lands in New South Wales and Victoria. The Murray forms the boundary of those two States and afterward flows through South Australia. It is to the interest of New South Wales and Victoria to use the waters of the Murray for irrigation purposes, and it is to the interest of South Australia to use the Murray for navigation. We hope to harmonize those interests and are working to that end.

Just before I left Australia I attended a conference, held on the border, between representatives of the various States as a result of which each has appointed a hydraulic engineer to a joint commission on irrigation. These will make an investigation and report their opinion in regard to the best practicable system for conserving, storing and distributing the Murray's waters without interfering with its navigation. We have good reason to believe that by means of a system of locks and weirs it is quite possible to irrigate a very large extent of dry country by means of the Murray without injuring its navigability. Later we will take up the problem of using the waters of the Darling in a similar way. It is a very long river, which during the rainy season sends an immense volume of water in to the Murray.

Another of our problems is in regard to forestry. We have planted some trees but not nearly enough of them and cannot yet tell anything about results. Along with this tree planting, also denudation of our timber has been going on, for Australian hard woods, being impervious to water, are now used all over the world for street paving purposes. Great harm has been done, and the waste is still going on, for our national Government cannot interfere in the matter and the land owners are in many instances reckless. The remedy must come from the common sense of the people.

We have the labor problem also, the question of keeping up wages to such a standard as will enable white men to live in

comfort. Laborers' pay averages about seven shillings a day all over Australia, but is a little less in Tasmania. Chinamen can live on a few pennies a day, and their labor is discouraged, for in regard to one thing all Australia is emphatically resolved, and that is that the race must be kept pure, and that necessitates prevention of competition which would degrade white labor to the level of black and yellow and so bring about the intermingling of races.

Taken on the whole Australia is doing very well, and it looks as though we are going to succeed in building up a strong, intelligent, active and energetic nation in the Southern Hemisphere. In 1880 our population was about 3,000,000, now it is about 4,000,000. The immigration is almost entirely from Great Britain—English, Irish and Scotch—making a homogeneous people with few elements of discord. Increase from birth rate has not been up to the mark since 1893 on account of hard times discouraging marriages, but experience shows that a period of prosperity will soon remedy that.

The area of land under agriculture is fast increasing; we still continue to produce and export wool in large quantities; we are gratified to be the butcher shop of the entire British Empire; and our wheat fields are coming to the front. Already we export five bushels of wheat for every eight exported by Canada, which is good when one considers that wheat growing in Australia began so recently.

The farms have been suffering from a recent great drought, and there has been much loss of sheep in New South Wales, but news just received declares that heavy rains have fallen and relieved the situation.

No new startling discoveries of minerals have been made, but they are boring for coal near Sydney now, and it is strongly believed to be there. There are fine coal fields on either side of Melbourne, the seam dipping under the city. The output of the gold fields in Western Australia still continues to be high. Last year it was £7,000,000.

We have taken in British New Guinea as a territory, and are ready for further expansion. New Zealand, which is 1,250 miles away from our continent, has so far refused to join us, and as yet shows no signs of yielding.

We have no enemies in sight anywhere, and fear of them is not among our troubles. Now and then some alarmist declares that in case the British fleet was overcome we might be attacked, but that danger was always remote, and is now still more so on account of the recent strong drawing together of Great Britain and the United States during and since the Spanish War and the troubles in China.

Such a friendly understanding between these two great nations is the natural attitude for them, as they are not only racially akin but are also the foremost exponents of free government and opponents of that despotism which we find prevailing elsewhere.

Australia's feeling for Great Britain is one of perfect loyalty. She has always been generously treated by the mother country, and has never had anything to offset her gratitude, such as the oppression against which the United States revolted. On the other hand, her loyalty, like that of Canada, is not stimulated by the fact that she has a powerful neighbor south of our imaginary line against whose aggression she may at some time need all the protection that the mother country can possibly give her. Australia's loyalty is, therefore, perhaps quieter than that of Canada. Nevertheless it is deep, widespread and abiding.—N. Y. Indep.

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Soil.—The pineapple is a decidedly exacting member of the vegetable kingdom, insisting upon having its wishes and needs respected and provided for, making no allowance whatever for our good intentions, and well illustrating what Miss Green wood calls "the cussedness of inanimate objects." The soil is of first and most vital importance. The pineapple will grow upon soil too poor for other products, but this soil must be light, loose and thoroughly drained.

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The consumption of pineapples is increasing, both in America, England and European countries. The freight on pines was formerly very high to England and European countries, but a reduction has been made, so that the cultivation in the West Indies has had a marked increase to supply the demand. When picked at the right season and well put up in boxed crates, they are said to arrive in good condition. The consumption of this fruit in the United States has not increased to the same extent as in Europe. From an article in the Jamaica Bulletin by Chas. E. Smith, we make some extracts, regarding the best treatment of the plant and fruit which may assist any who proposes to engage in its culture of this fruit.

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Planting.—The land being properly prepared and the suckers secured—by the way, they should be 12 or 18 inches long and selected from healthy plants which have borne or are bearing fruit—we are ready for planting. Opinions differ as to the best distance, there being arguments in favour of both wide and close setting. Four years ago I commenced planting at the usual Florida distance, 22x22 inches then 24x24 24x30 2x2ft., and even 3x4ft. I have gradually been working back to shorter distances, and have just set 2,400 at 18x24 inches. I believe 2x2ft. may be considered safe, though much depends upon the location and variety. In St. Thomas-ye-Vale where the sky is clouded a great part of the time and there is a heavy rainfall, wide planting seems desirable, but in St. Andrew I prefer close planting, so that the ground may become quickly shaded to prevent scalding of the roots. Care should be taken to have the plants set in true lines each way. Many methods of accomplishing this will suggest themselves.

My own way is to run a base line the width of the field at right angles to the beds; I then stretch a line along each side of the bed to be planted, staking off these lines at the distance I wish to set the suckers in the long rows. I use a strip to set across the bed, and move this strip from stake to stake, of 1x3 board with notches showing where each plant should planting the suckers with a small hand trowel.

The handle of the trowel may be used for pressing the earth firmly about the base of the plant. The only preparation of the sucker is to strip off the lower leaves, and cut the broken end clean that it may callous readily.

CULTIVATION.—The cultivation consists in keeping the plants clean all the time. Remember that the pineapple is an aristocrat which will sulk if required to share its surroundings with more plebeian plants. In Florida, where the soil is practically barren of plant food, artificial manuring is necessary, and in the covered pineries about Orlando as much as 3 tons of highly concentrated fertilizers per acre are used. Again, the pineapple shows its patrician tastes in that it is decidedly capricious as to its food. Such organic manures as cotton seed meal and castor pommace invariably give poor carrying fruit, though dried blood does not seem to be objectionable as a test of 193 plots treated with different fertilizing ingredients and combinations of ingredients carried on by the Florida Agricultural Experiment Station resulted in favour of Blood, Bone and Potash. It is also strange that though superphosphates made of bone treated with sulphuric acid are not injurious, yet when the base is of rock phosphate (marine bone deposits) this is generally regarded as poisonous to the pine. I may remark, however, that I have never received any return from the money I have expended for phosphoric acid for this fruit. Up to the present time, Jamaica soils do not seem to require artificial fertilizers while in some cases their use seems to have resulted in actual disaster. It stands to reason, however, that our soils cannot yield 10 to 20 tons of fruit year after year without this drain needing to be made good in time, and I am much interested in a series of experiments now being conducted by the Island Chemist, which may also show some effect in the carrying qualities of our fruit.

GATHERING AND PACKING.—What a sense of satisfaction the grower feels as, after months of anxiety and labour, his fruit approaches maturity and he begins to think that his woefully one sided ledger account may begin to show a better balanced appearance! Yet beware the experience of the glass vendor in "Arabian Nights" whose day dreams had made him Grand Vizier about to marry the Princess when a slip of the foot brought his bright visions and his fragile wares in ruin to the pavement! "Eternal vigilance" is the price of satisfactory pineapple sales, and all your hopes may be dashed even now by careless or improper methods. The woeful inefficiency, indifference and lack of loyalty on the part of the Jamaica

labourer makes the unceasing personal attention of the employer absolutely necessary while the fruit is being gathered and packed for shipment. It is impossible for me to explain, save in the field, just when a pine is fit for picking. It varies, indeed, with the season of the year and the distance it is expected to carry. One point is vital—the fruit *must* have attained its full size. A pine not properly matured will decay before it ripens, or if it ripens it will be a poor apology in flavour for this luscious fruit. An inch or more of the stem should be left attached to the fruit by which it is hung up to dry for 24 hours or more when it is ready for packing. A number of styles of pineapple crates are used, the important thing being that they should give good ventilation. Until recently I have used the "Orlando Pineapple Crate" 12 x 20 x 22 inches, holding two layers of 7 to 14 Smooth Caiyenne or 16 to 20 Ripleys. Later experience however has assured me that a single-layer crate is more desirable, as the fruit seems to carry better. The buyer also prefers it, as it enables him to inspect all the fruit at a glance.

Pines should always be wrapped in something to protect them from bruising. Some use common Manila paper, but this hardly gives the desired protection. I use "Excelsior" made of fine wood shavings. Clean dry hay or straw will answer. Banana trash well dried is also used. In the Azores, corn husks stripped fine with a rasp like a large curry comb is the common packing material. Pines should be packed firmly that they may not fall about, but should not be jammed into the box. In packing, the first pine is placed with the but towards the packer in the lower left hand corner of the box, the second against it the but at the upper side of the box, the crowns overlapping and so on the buts and crowns alternating. If the box contains two layers, the first pine of the second layer goes in the upper left hand corner, the but coming over the crown of the fruit below it. The two layers will be just reversed, similar to the method of "breaking joints" as it is called in orange packing. Stencil the wood "Top" on both top and bottom sides of the crate that when opened the fruit may be seen in layers just as packed. As far as possible the crowns should be protected from bruising as they add greatly to the appearance and selling value. Exercise every care to make the package neat and attractive, for with fruit as with people—"first impressions go a long way."

Insects and Diseases.—While the pineapple requires, and repays constant attention and care, yet when compared with many other plants it cannot be said that it suffers severely from insects or diseases.

The only insects which seem to affect it are:—mealy bugs, red spider, and scale. The spider and scale are rarely serious. The mealy bug may become so if neglected and will cause

serious stunting of the plant and fruit. Infesting as it does the white portion of the leaves about the body of the plant the use of sprays is practically unavailing. Much good is done by dipping the base of the sucker in a decoction of tobacco stems, 1 pound of tobacco to 2 gallons of water, before planting, but the only sure treatment is fumigating with hydro-cyanic acid gas as recently described in a Bulletin issued by worth a pound of cure."

The diseases or maladies of the pine are:—"blight," "sanding," "spike," and "tangle-root."

"Blight" is a very serious trouble generally ascribed to a fungus. An acquaintance who was visiting Jamaica last winter, and who is interested in scientific research in an amateur way, kindly devoted much time to a study of this disease, making careful microscopic studies and cultural tests which demonstrated very clearly that healthy leaves can be inoculated through the spores of diseased plants. In practice we have reason to believe that a diseased stock will prove a centre of infection for surrounding plants. The best course to pursue is to dig up the plant and burn it immediately, saturating the soil where it stood with a strong solution of copperas. A plant if taken up and the but trimmed back to healthy tissues when the wilting is first discovered, may sometimes be saved, but on the whole I think it is wiser to be rid of it at once. Fortunately the disease does not spread rapidly and may easily be checked by the observant cultivator if taken in time.

"Sanding" is not so common in Jamaica as in Florida where the soil is lighter and easily blown into the heart of the plants. Ants cause much trouble here, however, by carrying earth into the leaves, but this is an effect, not a cause, and is due to the presence of the mealy bugs which the ants try to protect, being fond of the sweetish secretion with which they cover the leaves.

I have already referred to "Tangle-root." Authorities differ as to its nature but I think that in a majority of cases it is simply due to poor preparation of the land; the roots being unable to freely enter the earth and so winding about the but, cause strangulation as the stock expends.

Varieties.—I presume that to a majority of people in northern countries a pineapple is a pineapple, just as to the average Jamaican a peach is a peach, yet the different varieties vary greatly in quality, appearance and merits. I think on the whole we should be thankful that propagators have not been too ambitious in rolling up a long list of names as has been the case with oranges. The Florida Horticultural Society tabulates a list of 73 different varieties of oranges and that without synonyms. Counting the synonyms which some enterprising nursery men in Florida insist upon con-

sidering district varieties, the list swells to something like 110.

It is possible that some of them may be the same under different names. On the other hand there are some varieties not included, for example the Trinidad of the English hot houses is not mentioned. Possibly the compilers considered it identical with the Porto Rico, an error I think, though it may be a seedling or selection of that variety, nor does the list include a sub-variety of the Smooth Cayenne—the "Variegated Smooth Cayenne" bearing the same fruit but noticeable chiefly for its beautiful variegeted leaves, of green, white and red stripes. But one Ripley is mentioned, whereas in Jamaica we know that the Red and the Green Ripleys are very distinct. Still I mention in this connection the curious fact that a Green Ripley plant often throws out a red sucker or bears a fruit having a red crown and vice versa.

The Red Spanish I think is identical with our Bull-Head, though I know many will differ with me. Certain it is that I have often shipped Bull-Heads under the name of "Jamaica Pines" and my Agents in New York have reported "your Red Spanish have sold for &c., &c." The Black Jamaica is desirable because of its size. It is also a very fair shipper. The "Sam Clark" which, of course, is not included in the list I have quoted, and which, I believe is not known outside of Jamaica, has always been an interesting native variety to me, as I believe it has considerable possibilities. It is of a good shape packing out nicely, and has a most showy and attractive crown. To a cultivated taste its flavour is inferior, and its acid distinctly "raw." If this can be modified by some generations of cultivation, the variety will prove an acquisition. The Sugar Loaf, as largely grown in Cuba as here, is so badly affected with "black heart" as to be of little value for shipping. While I believe there is a great field in the selection of our native pines, yet speaking from a purely commercial point of view, and considering the rapidity with which the planting of this fruit is being extended in other countries, I can but feel that the time must come in the near future when only the choicer varieties can find a market. The Porto Rico was at one time very popular for open air cultivation in Florida, especially along the East Coast, because of its large size. I had one in Bog Walk, in this Island, weighing 14¾ lbs. Its size, however, is its one and only merit. It is a shy bearer, requires double the room of others sorts, and in quality is no better than our Bull-Head or Black Jamaica. I do not think it is being planted largely now, better kinds having succeeded it.

The Abbaka somewhat resembles a very large red Ripley though more conical at the base. It is much above the average size of pines and is of delicious flavour—none finer for home use. In dry weather it ships very well (though this is equally true of nearly all sorts) but during the rains it is

extremely uncertain. Probably no other pine is so productive of slips.

The Egyptian Queen was at one time the favorite "fancy" Pine in Florida. It was originally the Cleopatra, its present and better known name evidently the result of a rather shaky knowledge of Egyptian history. It no longer holds its high place in the esteem of planters which it once occupied. It is in every way inferior to our Ripley.

The Smooth Cayenne, everything considered, is to my mind the pine *par excellence*. Its large size, perfect form, excellent flavour and beautiful appearance make it the King of Pines. It originated, I believe, in the English Hot Houses, later was grown in the Azores under glass, but without heat, then carried to Florida where it is the most popular and most profitable variety grown under shelter, and is now being successfully cultivated in Jamaica. I must say I have seen specimens here equal in every way to any I have ever seen elsewhere. It is specially valuable for the English markets whre size and beauty of appearance count for even more than flavour.

I should be "carrying coals to Newcastle" to describe our famous Ripley before a Jamaican audience. Strange to say it was a failure in Florida—for what reason I do not know and I hardly recognized it when I came here. In the quality which pleases the palate, I consider it ranks above the Cayenne. Surely nothing can be finer than our St. Andrew Ripley. It is also a good shipper. I have sent it to all parts of England and had excellent reports as to its condition on arrival. I rank it with the Smooth Cayenne as the first among pines. Its one regretable feature is its small crown. Its warmest admirers have to admit this one weak point. Could we but get the size, form and crown of the Cayenne, combined with the flavour of the Ripley, we should have the ideal, the perfect pine; and in this connection I must express the deep interest I feel in the experiments in crossing these two varieties now being carried on at Hope. Seeds have been obtained from this cross, and the young seedlings were thriving when I last saw them. I sincerely trust that the hopes and expectations of the gentlemen who have devoted so much time and labour to this work may be amply rewarded in the results.—Jamaica Botanical Bulletin.

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To the friends of Agricultural Operations at the Hawaiian Islands:

At a public meeting of those persons interested in the pro-20th, it was unanimously resolved that the formation of an association for the promotion and improvement of agricultural operations and products in these Islands, was highly desirable: that such and an association would meet with cordial support from all classes of foreigners resident on these Islands, and would also be encouraged and fostered by the Hawaiian Government. It was also voted that all persons in-

terested in the subject, should be invited to assemble in Honolulu in the month of August next, for the purpose of organizing such an association, and the undersigned were chosen a committee to carry out the above design, by appointing a day for such convention, and addressing a circular to all persons interested, explaining the objects of the contemplated association, and inviting their attendance and co-operation in carrying out these objects.

The importance and almost necessity of an institution like the one contemplated is too evident to require exposition. For years past, the agricultural interest of these islands have been insignificant, and their pursuit unprofitable. With an uncertain and distant market—with little or no encouragement, or facilities given to foreign tillers of the soil, without proper knowledge of that soil, or sufficient capital to experiment upon its capabilities, most of the agricultural enterprises have languished or utterly failed. And with the exception of a few sugar and coffee plantations, the proprietors of which have invested too much capital to be able to abandon them without heavy loss, and which were still struggling on with doubtful prospects, the whole amount of agricultural operations at these islands consisted in the raising of fruit and vegetables for the fleet of whaleships that semi-annually touched here for supplies.

Within the last two years, however, a great and sudden change has taken place in the prospects of this group. The extension of the territory and government of the United States to the borders of the Pacific, the wonderful discoveries in California, and the consequent almost instantaneous creation of a mighty state on "the western front of the American Union," has, as it were, with the wand of a magician, drawn this little group into the very focus of civilization and prosperity. We find ourselves suddenly surrounded by intelligent, enterprising neighbors, who call loudly to us to furnish of our abundance and receive in exchange of theirs. Our coffee and sugar no longer remain piled in our warehouses. Our fruits and vegetables no longer decay on the spot where they were grown. We are not even compelled to seek for them a market, but clamorous purchasers come to our very doors and carry off our supplies with an eagerness that has caused us to feel a scarcity ourselves, and we are assured that not only for all these, but for any other products of the soil that we will raise, a ready and increasing demand may be relied on from our enterprising neighbors. The native government too, impelled by the irresistible influence and example of the Anglo-Saxon energy and progress, which it sees in every direction, is relaxing its former tenacious grasp on the arable lands of the Islands, and even inviting and encouraging their cultivation by foreign skill and capital.

With these brilliant prospects suddenly opening to these Islands, let us inquire how far they are prepared to render

them avaliable. With every variety of soil, adapted to all the productions of the temperate and tropical latitudes, we find the agricultural operations of these Islands checked and embarrassed by the insufficiency of the four great requisites of capital, experience, proper implements and labor.

It is a fact worthy of remark, that, as your commtitee believe, without a single exception, all the plantations that have been commenced at the Islands, have been so commenced by persons possessing neither experience in the businses they were undertaking, or the requisite capital and knowledge of the soil, to carry it through to a successful result.

Plantations for the growth or manufacture of silk, cotton, coffee, sugar, &c., have been commenced under such circumstances, and their failure, in some instances, is not to be wondered at, when we take into consideration such circumstances, added to the disadvantages of the *then* isolated position of this group, almost cut off from communication with the civilized world, and the knowledge, capital, proper implements, &c., so readily rendered available at home. Large sums of money have been thrown away on experiments, which the experience of persons acquainted with the business would have enabled them to avoid, and no system of intercourse between the planters has been established, by which the experience of one could be rendered available to another. And these are the great drawbacks from progress now. But few of our planters have sufficient capital to enable them to purchase the services or experience of others, and they are consequently learning by hard, expensive and slow experience themselves, and with few facilities of communication, and some may still be pursuing plans which others have found to be fruitless.

To meet these difficulties, to provide for these wants, to render the experience of other countries available to this, to supply by a combined action, facilities and information to *all*, which cannot be procured by individuals, to encourage and foster agricultural operations in every form, is the main object of the proposed association. The merchant, the mechanic, the professional man, indeed, all classes of consumers are equally interested with the producer, in the prosperity of this branch of labor, and we hope to have your aid and your personal co-operation in promoting these objects.

It is proposed that the association shall subscribe for the principal standard periodicals and newspapers devoted to agriculture, and if the means of the society allow, an able editor shall be engaged for an agricultural magazine to be published at Honolulu, which shall contain such selections from these periodicals as shall be most useful or interesting to the members, and shall also contain original articles and correspondence. Your committee would also suggest for your consideration, the property of the establishment of an agricultural warehouse at Honolulu, for the importation and col-

lection of such kinds of agricultural implements and machinery, plants, seeds, &c., as are most adapted to this soil and to the laborers employed. The advantages of such an establishment are obvious to all who have had any experience in the matter, as most of the implements shipped to this market by merchants who are unacquainted with its wants, are entirely unadapted to the necessities of the planters. Such a warehouse could also be a depot for the sale of the products of the various plantations and farms, the proprietors of which have not special agents at Honolulu.

The improvement of the breed of cattle, horses, swine, sheep, poultry, &c., is another great object of the society. Stated annual exhibitions could be held, and encouragement given to farmers and planters, by premiums being awarded for superior specimens of their products.

Another subject of great importance before this association is that of *Labor*. The introduction of Coolie labor from China to supply the places of the rapidly decreasing native population is a question that is already agitated among us, and should such a step become necessary, the aid of such an association in accomplishing this object would be of great benefit. All these objects, if left, as heretofore, to individual enterprise, would wholly or partially fail for want of the necessary means, but could easily be effected by an organization like that contemplated.

Having thus stated some of the objects of the proposed association, your committee most earnestly and cordially invite your presence and co-operation in the accomplishment of these objects. We have appointed as the time most convenient for the planters from other islands to assemble in Honolulu, Monday, the twelfth of August next, for the first meeting for the purpose of organization. Due notice will be given of the hour and place of meeting.

An address will be delivered on the occasion by the Hon. W. L. Lee, and it is hoped that addresses will be made by other persons. Your committee earnestly request the attendance of all who feel interested in the objects of the meeting. The statistics of agricultural operations on thsese islands, the capacities and nature of the soils, the experience of farmers, planters, graziers, and others on this group would prove useful and interesting topics to be brought before the meeting.

Your committee would also request that specimens of the various products of the islands, such as sugar, coffee, potatoes, indigo, arrow root, &c., be sent for exhibition at the meeting. Animals of superior breed, such as cattle, horses, sheep, poultry, &c., might be sent for exhibition, and a public sale might be made of any such that the owners might wish to dispose of. A building will be prepared for the reception of such specimens.

In conclusion your committee would again urge upon your

attention the importance of the proposed association. A full attendance of all who are interested in the accomplishment of the objects of the convention is solicited; as the aid and countenance of all is needed to secure its success.

Stephen Reynolds, W. Newcomb, J. F. B. Marshall, R. W. Wood, W. L. Lee.

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(Continued From Page 10.)

"At the present day it has attained to a high degree of improvement, and is constantly growing in dignity and importance. The numerous societies which have been formed for its promotion in Europe and America have given it an impulse which seems to promise a progress and development in the science hardly conceivable. In Germany, France, and other parts of Continental Europe, schools have been established for its promotion, and it is receiving the attention of chemists and other men of science; but in no country has it reached the distinction which it possesses in England. British Agriculture, is undoubtedly more scientific and instructive, than any other in the world. It is the great interest of that Kingdom, and one which is watched over with a vigilance that never sleeps. So great is it, that until very recently it has been able to shut the door against the admission of foreign bread stuffs, and by means of its corn laws to create a complete monopoly of British grain, even at the expense of dear bread to the great body of the people. The agricultural interests of Great Britain are in the hands of her nobility, the principal landed proprietors of the Kingdom, and the eminence which it has attained, is owing in no small degree to their exertions in the formation of Boards and Societies for its advancement. Perhaps no part of the United Kingdom has felt the influence of these societies to a greater degree, and exhibited so rapid an improvement in agriculture during the last half century as Scotland. Naturally one of the most sterile and inhospitable of countries in soil and climate, it has become, under the hands of her industrious and educated farmers, one of the most fertile and generous. The change which has been wrought in the face of that country within the last fifty years, is said to be almost miraculous. Whole districts, once more desolate than the mountains of Hawaii, have been made to blossom as the rose. The change in England, according to Macaulay, is hardly less wonderful. Great Britain is estimated to produce annually between 350 and 400 millions of bushels of grain, and her agriculture is not only of vital interest to the twenty-seven millions of inhabitants, whom it feeds, but a matter of no small moment to the whole civilized world. Daniel Webster, that distinguished American statesman and farmer, remarked more than ten years ago, that, "should there

be a frost in England fifteen days later than usual,—should there be an unreasonable drought or ten cold or wet days, instead of ten warm or dry ones, when the harvest should be reaped, every exchange in Europe and America felt the consequence of it." The truth of the remark has been fearfully demonstrated by the potato rot of Ireland. The decay of a single vegetable has been the starvation of thousands, and has agitated to its remotest extremeties the commerc and business agitated to its remotest extremeties the commerce and business produces almost as great a sensation in the United States as in England itself; for the vacuum produced, must be supplied mainly by the surplus products of America. It is well known that within the last few years, owing to the failure of crops in Great Britain, the United States has transported an immense amount of agricultural products to her shores, feeding the starving with her bounty, and realizing enormous profits from her sales.

"In the United States the agricultural interest has always been in the ascendancy; and her farm houses have ever been the nurseries of her best and most distinguishd citizens, from the days of the immortal farmer of Mount Vernon, down to those of the honored husbandmen of Marshfield and of Ashland—of Lindenwald and of North Bend. Five-sixths of her entire population are said to be engaged in the labors of the field, and the products of her soil for the last year have been estimated at upwards of 1000 millions of dollars. It is true that agriculture has not attained to that perfection in the United States which it has reached in England, but this is owing not to any want of effort in its promotion, but rather, if I may so speak, to the want of *necessity*. In the United States every man may become the proprietor of a large estate, which he need only half till to be independent of want. In England it is far different. There no soil must lie idle or be partially tilled; for upon his little field depends not only the farmer's subsistence, but his ability to meet his rent. American agriculture has the sweep of almost endless territory, and knows no limits but the demands for its products. The farmer of America may almost say—

> "No pent up Utica contracts our powers,
> For the whole boundless Continent is ours.

"The importance of agriculture and the necessity for its encouragement as a means of national prosperity must be obvious to all. The culture of the soil lies at the bottom of all culture, mental, moral and physical. In every country has it been coeval and inseparably connected with civilization. The dawn of one is the birth of the other. Check one and the other languishes; divide them, and both die. It is an axiom of history too plain to admit the question, that until the savage abandons his roaming, hunting and fishing, and laying

aside his vagrant habits, confines himself to some fixed abode and improves the soil, he can never become a civilized being. Like every other wild animal, before man can be tamed or civilized, if you please, you must confine him to some local habitation and gather around him the attachments of place and home. I repeat what I have already said that it is agriculture that civilizes a nation—it is agriculture that feeds a nation—it is agriculture that clothes a nation, and it cannot be denied, that which civilizes, feeds, and clothes us, must be regarded as the chief pillar in the temple of national prosperity.

"England, great as she is in her manufactures, and justly proud as she is of that commerce whose giant arms bind the globe in her embrace, would be weak indeed, if deprived of the productive power of her soil. Agriculture is the *body* of which manufactures and commerce are but the *members*. Both the latter may be lopped off without destruction to the former; but touch the heart of agriculture and it is death to all. As in England, so is it in the United States. She looks to the surplus products of her soil to furnish materials for her Lowells and her Manchesters, and commodities to freight her ships for trade with foreign countries. So is it in every great country; and so, if we would prosper, must it be here. Until we produce more than we consume,—until our surplus produce afford an export exceeding what we import, we can make no advance in wealth or prosperity. In all countries the products of the earth, and the animals it sustains form the main reliance of the state. Mines of gold and silver richer than those of California may fail, or the poor digger starve while groaning under the weight of his hard earned treasure, but the well cultivated field and abundant harvest are an exhaustless mine, and are sure to close the door against want, and fill the land wth comfort and plenty.

"I have said it is not only the source of physical but of moral health to a nation. So it is. In every country where man is not reduced to a slave, those engaged in rural labors are the most moral and religious. It is natural it should be so. The husbandman, removed from the giddy pleasures and vices of the town, sows and plants, and looks up to God to bless the labor of his hands. 'For all his peculiar blessings he is invited to look immediately to the bounty of Heaven. No secondary cause stands between him and his Maker. To him are essential the regular successions of the season, the timely fall of the rain, the genial warmth of the sun, the sure productiveness of the soil, and the certain operations of those laws of nature which must appear to him to be nothing less than the varied exertions of omnipresent energy. In the country we seem to stand in the midst of the great theater of God's power, and we feel an unusual proximity to our Creator.'

"Farmers, and by this term I do not mean the serfs of Russia—the vassals of an absent lord, or the hired laborers of

a great planter, but those who own a portion of the soil and till it, are of all classes the most moral, contented and independent. They love order and peace and are not willing to jeopardize all the comforts and enjoyments that cluster around their rural homes, by promoting popular tumult.

"In my opinion agriculture is a matter which has been too much overlooked in the Sandwich Islands. That so little has been done towards its promotion, is, at the first glance, a matter of astonishment to all. But when we strike beneath the surface of things, and examine the tenure by which the people have held their lands, and the little protection they have had for the products of those lands, our wander vanishes. Until within the last year the Hawaiian held his land as a mere tenant at sufferance, subject to be dispossessed at any time it might suit the will or caprice of his chief or that of his oppressive *luna*. Of what avail was it to the common people to raise more than enough to supply the immediate wants of their subsistence? Would the surplus belong to them, or afford the means of future independence? Far from it. It would go to add to the stores of their despotic lords who claimed an absolute right in all their property, and who periodically sent forth their hordes of *lunas* to scour the country and plunder the people without the shadow of right or mercy. Often did these ravagers—these *Land Pirates*, leave the poor *makaaina* with little else than his maro, his digger and his calabash! With such a tenure to their lands, and with such protection continued in our next or rather want of protection for thier products, what could be expected of agriculture or the people? I thank God that these things are at an end, and that the poor *kanaka* may now stand on the border of his little kalo patch, and holding his fee simple patent in his hand, bid defiance to the world! Yes, I thank God that he has moved the hearts of the King and Chiefs of these islands to let the oppressed be free! The granting of Royal Patents in fee simple to the common people for their lands is the brightest jewel that adorns the crown of Kamehameha III., and will shine with increasing lustre long after his body shall have moulded to its mother earth!

"The agricultural prosperity of a country is greatly dependent upon its landed tenures; and it has been justly remarked, that 'give a man a barren rock in fee simple, and he will soon make it a garden; give him a garden with an insecure title and he will soon convert it into a desert.' The social and political condition of a country also depends in no small measure upon its landed tenures. So true is this, that when we seek to know the state of a nation, one of the most important questions to be asked is, By what title do the people hold their lands? Let the peasant hold his land at the will of another, and he is a serf; give it to him in fee simple, and he is a man!—an independent, a better, a more useful man."

(To Be Continued.)