

Hawaii Gazette Supplement November 5th, 1884.

REPORT OF COMMITTEE ON MACHINERY.

To the President and Members of the Planters' Labor and Supply Company.
Your Committee on Machinery are pleased to have the honor to present to you the following report on the subject of machinery for the sugar plantations of this island. It is the result of a series of experiments conducted during the past few months, and is intended to give you a general idea of the progress made in this branch of our industry.

The first of these experiments was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The second experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The third experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The fourth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The fifth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

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The ninth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The tenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The eleventh experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twelfth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The thirteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The fourteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The fifteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The sixteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The seventeenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The eighteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The nineteenth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twentieth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-first experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-second experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-third experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-fourth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-fifth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-sixth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-seventh experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-eighth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The twenty-ninth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The thirtieth experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The thirty-first experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

The thirty-second experiment was made at the plantation of Mr. W. H. Ruckard, at Waialeale, and was conducted by Mr. H. H. Galt, of the Hawaiian Agricultural Society. It was a trial of the diffusion process, and was successful in showing that this method is superior to the ordinary method of crushing cane.

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It is admitted on all sides that diffusion is the method by which the sugar matter may be most thoroughly extracted from the cane, and it is to be hoped that the planters will find it worth while to combine in an experiment which will settle the practical questions of the method without involving a heavy outlay on the part of any individual.

The experiments made by the Department of Agriculture in the United States, with diffusion applied to sorghum, indicated that the machinery required for a moderately sized plant to test diffusion on a working scale need not be very expensive. The machine employed to slice the cane consisted of a central cast iron disk with knives set in slots as a plane from it set in a carpenter's plane, so that the canes were fed against this revolving disk, and slices were taken off from $\frac{1}{4}$ to $\frac{1}{2}$ of an inch in thickness. The cane was cut at right angles but obliquely, so that the slices were diagonally across the cane stalk. It was estimated that the power required to slice the cane in this manner was less than would be required to crush in the ordinary manner.

In the pamphlet published by Mr. H. W. Wiley, the chemist in charge of these experiments, the diffusion battery and methods of operation are carefully described and the results fully recorded.

The most serious question in connection with the diffusion process seems to be one of fuel. It is probable that the bagasse from a diffusion battery will be worth much less as fuel than trash from a crushing mill, and the question whether the extra gain in sugar will pay for sufficient fuel to supply this deficiency, as well as to evaporate the additional water, seems to be one that can be decided only by trial.

Believing that sufficient time has been occupied by this report, your Committee respectfully submit it.

H. H. GALT,
H. F. GALT,
W. H. RUCKARD.

REPORT OF COMMITTEE ON TRANSPORTATION.

To the President of the Planters' Labor and Supply Company.
Your Committee on Transportation were convened on yesterday the duty of making a Report on Cane Transportation, for you to accept the following. From all we can gather upon this important subject at this late date for inquiry is, a little progress has been made the past twelve months. Some changes for the better, and some combination of two or more different ways of transportation have been made with some degree of advancement.

Oxen in some cases have been exchanged for mules, and others contemplate changing. Gravitation railways are growing in favor in hilly regions, and are worked quite successfully in combination with carts, sleds, and horizontal tramways.

Carts and sleds are also used to transport cane to water flumes, from points on plantations not convenient to be reached by a flume. Where water can be had and grades suitable, fluming is preferred to all other modes of transportation.

The rail road, where the country is comparatively level, yet continues to be the most favored for transporting cane long distances. The intelligence and experience of plantation owners and managers, have enabled them to adopt this far that particular mode of transportation best suited to their locality.

Where conditions are suitable and distances not too great, carts and wagons are the cheapest for transporting cane, the flume follows next in cheapness.

There is some new idea spring up in the use of wagons and horses which may become of some advantage in localities where they can be used. It has been adopted by Kukui Plantation with fair prospects of success. It consists of strong light iron wagons, with low wheels (about four feet in diameter) with 4 and 6 inch tires, no bed, but a rack 20 feet long, with stakes 4 feet long, and placed 4 feet apart, this rack is placed upon the wheels with a seat and a suitable brake; 3 or 4 tons of cane can be placed crossways upon it, and drawn by four horses down alongside of the cane carrier. Then it is proposed to unload direct upon the cane carrier, and while being unloaded the team is hitched to an empty wagon standing near, and goes for another load. Hills of much grade, and bad roads should be avoided.

As an auxiliary, where there is a constant descent from the cane field to the mill, a sled 12 feet long and 21 feet wide, made of 4x6 timbers, and steers 2 feet long, can be profitably used, by attaching it to the hind axle of the wagon, and 1,000 or 2,000 pounds of cane can be placed upon it, and taken down at the same time with the same team. The wagon pulling the sled, and the sled acting as a brake upon the wagon. Thus arranged, they are a mutual help to each other going down with the load, and that much more cane can be landed at the mill, than if the wagon alone were used. In taking the rig back the team has more labor. But as the forward end of the sled is fastened, up under the hind axle clear of the ground, that end of the sled rolls down on the wagon with its load dragging the hind end upon the ground, the load being now off, the hind end is also raised and hooked up to the after part of the rack.

Thus the sled is taken back on the wagon. When again in the field the after part of the sled is let down on the ground, when it is again ready for loading. This rig, and thirty-five animals, and about as many men, is expected to deliver alongside of the cane carrier from 150 to 100 tons of cane daily. Where the lay of the land is favorable and the average distance not more than one-half or three-fourths of a mile, gravitation doing most of the heavy hauling and the cane having to be handled than in any other way recommends it for serious consideration where it can be used. Respectfully,
JOHN M. HORNEN,
JOSE ADOSTE.

Mr. J. M. HORNEN, Chairman of Committee on Cane Transportation.
As one of your committee, I beg leave to submit the following, to be embodied in the report on the subject.

There are various means employed to transport cane to the mills, on the Islands, viz.: Steam tramways, wire ropeways, stationary flumes, portable flumes, mule carts, ox carts, &c.

Some plantations have but one of these methods, while others combine several. To make the most of the cane, and to get the most out of their workings, and our destructions as the most satisfactory method, and the results, would be a work of time, so that I shall only attempt to give a short description of the different methods on the Pala Plantation, giving the approximate cost per ton by each.

We use mainly but two systems, fluming, and hauling without flumes. We flume the cane from the upper lands, using the water for irrigating the lands below the mill.

We have five flumes about three miles each in length, and one mile apart. We cut the cane from the field to the nearest flume, where we have a gang of men stationed who cut the cane into short lengths and put it into the flume, through which it is carried and delivered on to the cane carrier.

In estimating the cost of transportation, we assume that the grinding season is 200 days, and that we flume cane 125 days, and cart direct to the mill 75 days. The cost of transporting cane by flume is about \$6.10 per ton of sugar, and is made up as follows:

Estimated cost of 15 miles of flume, of \$85 per mile, flume to last 4 years	\$12,750 00
For interest, 10 per cent, and wear and tear 20 per cent, per annum	2,750 00
Loss of water sufficient to raise an amount of cane worth	1,500 00
20 cents @ \$125 each, interest wear and tear on same, 20 per cent.	624 00
300 tons of oxen cart @ \$75 per ox, interest wear and tear 20 per cent.	1,125 00
Total for transporting cane for about 2,000 tons of sugar	7,000 00
Or about \$8.50 per ton of sugar.	

Then we have for labor per day, 25 bullock drivers, 12 men at flume, 3 men to watch flume, 3 men at cane carrier, and 2 men at rolls, total, 45 men @ \$1.00

Assuming that we make 17 tons of sugar per day, the cost per ton for labor is about \$2.60

Or a total of \$6.10 per ton of sugar.

The cost from the lower field is less, being as follows from fields average distance from mill $\frac{1}{4}$ of a mile:

30 carts @ \$125 each, 20 per cent, wear, tear and interest	5,250 00
30 bullock carts @ \$75 per ox, interest, &c., 20 per cent.	1,875 00
Or per ton of sugar calculating 17 tons per day	1 88
Then for labor 25 bullock drivers per day, 12 men at cane carrier, and 2 men at rolls, total, 45 men @ \$1.00	45 00
For 17 tons of sugar, \$2.82 per ton, or a total cost for transportation by this method of \$4.70 per ton of sugar.	

Owing to the necessity of feeding mules grain and the cost of getting cane tops for them, often from fields far distant from the mill, and other reasons too long to be mentioned here, the cost is greater where mules are used.

In considering the means for transportation of cane, the nature of the land and surrounding circumstances must be taken into consideration. As for instance, at Waialeale, where there is a comparatively level country with little available food for working cattle, the tramway is no doubt the best. Although not so cheap as some other methods, for although they have systematized the work there as well perhaps as anywhere on the Islands, the manager states the cost to be about \$7.00 per ton of sugar.

Mules are probably best for Hilo where water is worthless for irrigation, and there is not nourishment enough in the grass for working cattle. And so perhaps from the nature of the country mules may be the best for Honolulu.

While at Paia, the combined system of flumes and ox carts, using the water from the flumes for the lower lands, seem to me to be the best for us. Respectfully,
E. M. WALSH.
Honolulu, Oct. 22, 1884.

REPORT OF COMMITTEE ON VARIETIES OF CANE.

To the President of the Planters' Labor and Supply Company.
Sir,—The fact that the members of the various Committees have rarely any opportunity of meeting each other, except during the annual session, renders the preparation of reports by the Committees collectively almost an impossibility. And there is an additional difficulty in the way of the Committee on Varieties of Cane in that two of them are resident on the same island, and the Chairman, who is chiefly responsible for the report, is probably less familiar with his subject than almost any gentleman who listens to him.

It is clear from the various replies I have received, that the bulk of our planters are satisfied with the one valuable cane upon which they depend for their crop. Some state that they are so satisfied that they do not desire any other on their land than the Lahala cane. This cane has undoubtedly been, and is, a great boon to us, and we cannot but admit the loyalty of those who speak well of the bridge that carries them over the stream. But there are other proverbs just as valuable, and one is: "Never put all your eggs in one basket." Mr. Home, the Curator of the Botanical Gardens at Mauritius, warned us repeatedly when he was here some years ago, not to rely absolutely on any single cane, but to be prepared with substitutes in the event of some sudden disease attacking our chief variety. Again he wrote me, "I trust it may be a long time before you have to replace your Lahala cane, but there is no knowing, and it is well to be prepared."

I therefore believe that every planter should prepare himself for an emergency, by having a few acres of some other well selected variety planted every year to serve for seed in the event of failure of the Lahala cane, from the sudden development of some new toxic or blight. It was this conviction that led me to procure from Mr. Home at Mauritius, the seventeen varieties of cane which have been so well cared for by Mr. Jaeger, and from which distribution has been made to many plantations.

I received two Wardenian cases from Mr. Home containing 25 or 26 different canes, but only 17 named, as follows: one named, three brochet, five horse, six black fly, seven cane morfo, eight vulu vulu, ten millige, eleven vutana, twelve nanaui, fourteen vine, fifteen vagabonde, sixteen suna, eighteen seete, nineteen lomoloma, twenty-two kamba kamba vari, twenty-three green and red striped cane, twenty-four large green cane. Amongst the canes which did not survive was twenty-five belene, a rose colored one which, I understood from Mr. Home, was named by Mr. Terton who was the student of the Mauritius planter. This elegant is the cane I was most anxious to get, and I was much disappointed at its failure. I agree with Mr. Jaeger that further efforts should be made to procure this cane, and I hope this company will authorize the small outlay.

The first cuttings of these Mauritius canes were distributed during the first half of the present year, and it is too soon to speak of their results as yet. Some of them are doing remarkably well at Lanipohoa, at Honokaa, at Mr. Noley's, and at several other places. At Hilo, Mr. Spencer states that the white varieties planted in January at an elevation of 325 feet now strip six feet, and that there is no cane on the plantation that grows so well as the striped variety planted 1750 feet high, and which stood as well as Lahala cane. It is interesting to note that the Mauritius canes appear to grow too thick and may do better in other places.

The original plants can be seen now at the Agricultural Gardens in King street, opposite the residence of Captain Lane.

Queensland has supplied us with some new varieties of cane imported from Mr. Terton who has been tried on several plantations. Amongst them are one yellow Celestine, two big ribbon, three rose bamboo, four Otomati and five elephant. The result of these canes at Okaia has not been satisfactory, as stated by Mr. Saper, after three years' trial. They were introduced at Hilo in July last and appear to be growing finely. Of the result there it is too soon to speak.

Mr. H. M. Whitney has been very successful in developing a new kind of beer which has discouraged their cultivation. Mr. Rickard states that at Honokaa, at an elevation of 500 feet the vulu vulu, millige, nanaui, and loma loma seem to do very well and look healthy and vigorous, but the kamba-kamba and some other varieties are very poor.

Of the indigenous and acclimated canes there are at Hilo sixteen varieties, including the Lahala, which was brought here first from the Marquis and planted in Mr. Oudint's garden at Lahala. In the year 1867, I remember Mr. Hackfeld informing me that 14 tons was an average and two tons a good yield per acre for sugar cane, and the comparison of the old with the new canes at Lahala may have had something to do with this. Mr. Terton who has been tried on several plantations, was occasionally successful. Mr. Spencer states that at Hilo, during the present year, he has taken 67 tons per acre from second matons of Lahala cane. He also says that under favorable conditions the "China" yields as well as the Lahala.

Mr. Uma states that in 1861 and 1862 he purchased all the varieties of cane he could get on Maui and planted each variety by itself. He found that the best would penetrate all other canes before it would touch the Lahala, and that the latter having fewer and narrower leaves than the old native canes, the sun can more readily get access to the stalks, at the same time ripening the cane and hardening it against the assaults of its enemies. Mr. Uma draws attention to the importance of frequent transplanting of cane from a high to a lower level and vice versa, and from island to island, and also from dry land to irrigated. He states that the natives pursue this course with their kalo and so keep up the quality from age to age. There are nine varieties of ribbon cane grown at Hilo, and Mr. Spencer states that they all grow up to an altitude of 2000 feet.

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Mr. Uma states that in 1861 and 1862 he purchased all the varieties of cane he could get on Maui and planted each variety by itself. He found that the best would penetrate all other canes before it would touch the Lahala, and that the latter having fewer and narrower leaves than the old native canes, the sun can more readily get access to the stalks, at the same time ripening the cane and hardening it against the assaults of its enemies. Mr. Uma draws attention to the importance of frequent transplanting of cane from a high to a lower level and vice versa, and from island to island, and also from dry land to irrigated. He states that the natives pursue this course with their kalo and so keep up the quality from age to age. There are nine varieties of ribbon cane grown at Hilo, and Mr. Spencer states that they all grow up to an altitude of 2000 feet.

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