

RECENT ADVANCES IN TEA MANUFACTURE IN NORTH-EAST INDIA

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It was the writers good fortune to accompany Dr A. W. R. Joachim on a trip to North-east India in November, 1963. The purpose of this trip was to attend the 20th Tocklai Annual Conference in Assam. The conference is reported on in the preceding article. The opportunity of visiting a few estates in the area was also taken and this report is composed of observations made on these visits as well as on pertinent reports given at the conference.

In the report on a visit to North-east India in 1958 (Kehl and Keegel, 1959) it was stated that "since 1952 work has been going on at Tocklai to implement the plans of the Indian Tea Association for the modernization and rationalization of tea manufacture, the main objects being:

- (1) Improvement of withers,
- (2) Departure from conventional methods, and
- (3) Continuous manufacture."

It was then stated that it appeared that objectives (1) and (2) had been achieved but that it would be some time before objective (3) became a reality.

On our visit in November, 1963, we saw developments which would suggest that all three objectives have been achieved and by the end of 1964 they may all have passed the commercial testing stage. Figure 1 shows diagrammatically one possible arrangement continuously linking equipment which we actually saw in operation.

The tunnel withering unit diagrammed in Figure 1 is in operation at Hunwal Tea Estate in Assam. Leaf is brought from the field to the Trolley Loading Dock where it is loaded on to trolleys with wire mesh trays. The trolleys are pushed along a continuous track through a series of four tunnels where heated air is blown over the leaf from alternating directions. This ensures even withers. Scales at either end of the tunnels are used to weigh loaded trolleys for the purpose of controlling the wither.

At Hunwal the withered leaf is now hand fed into either a roller (without pressure cap) or a rotorvane followed by hand feeding into the C.T.C. Machines. However, the conveyor belt linked rotorvane C.T.C. rolling unit shown in Figure 1 was actually seen being installed in another factory belonging to the Assam Tea Company. In this installation withered leaf will pass from rotorvanes into Duplex C.T.C. machines by a conveyor belt resulting in a continuous rolling process. The Duplex C.T.C. machine being installed here was designed by the General Manager of the Assam Tea Company and it consists of two sets of cutting rollers positioned one below the other so as to give the complete C.T.C. treatment with no extra handling.

The continuous fermenting machine was the only machine shown in Figure 1 which is not yet available in commercial scale. The prototype has been in operation for some time at the Tocklai Experimental Station and very good results have been obtained with it. Leaf from the C.T.C. machine is spread on a continuous tray of special design and it is passed slowly through a closed tunnel. The air within the tunnel is internally circulated but it is not exchanged for fresh air. The

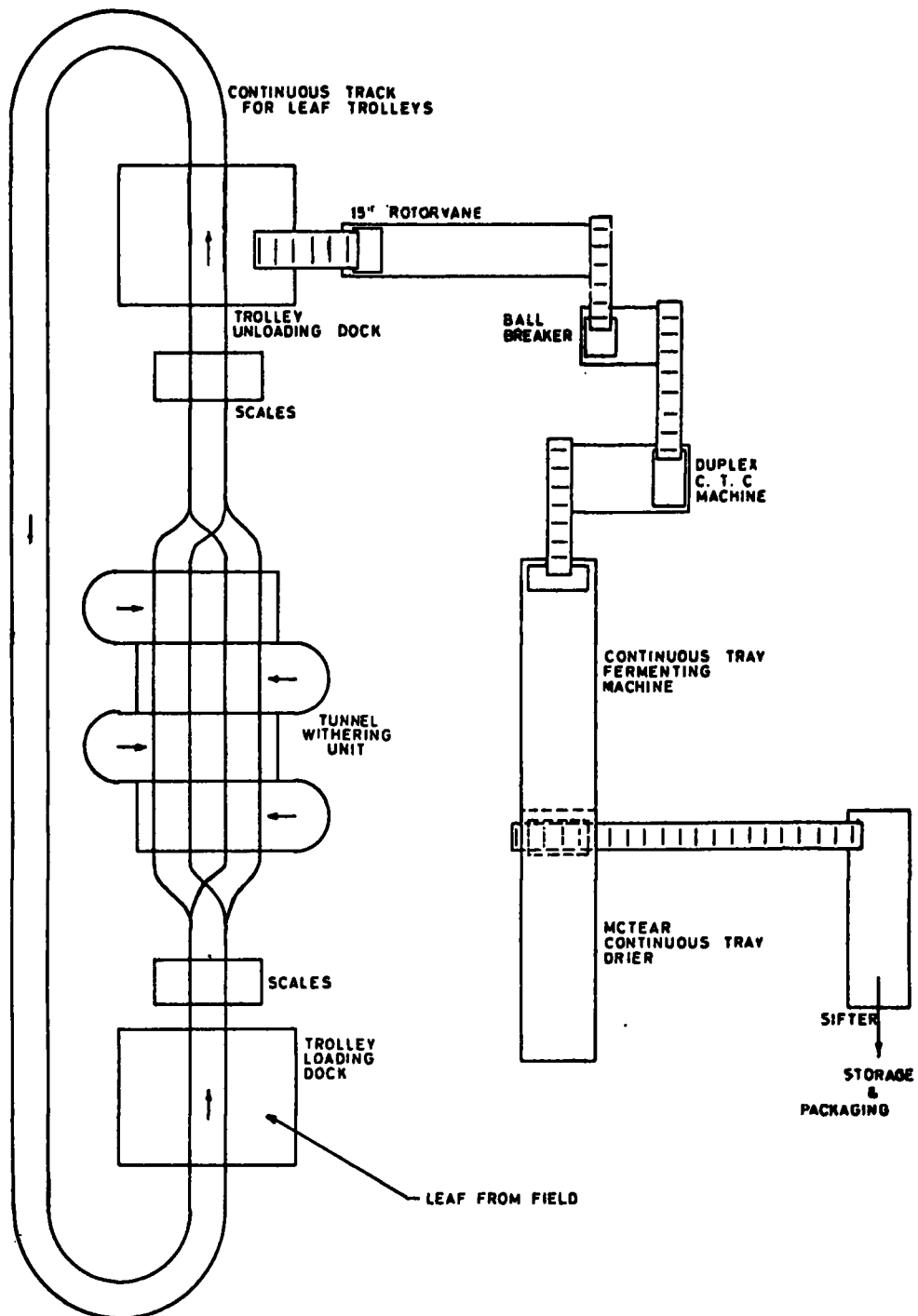


Figure 1. Diagram of Possible Scheme for Continuous Tea Manufacture Utilizing Equipment in Use in North-East India. All equipment in the diagram is linked by conveyor belts.

fermentation is sustained by the continuous addition of a controlled amount of oxygen. In this closed system the fermentation is complete in about 45 minutes and the fermented leaf travels into the drier on the same continuous tray on which it is fermented.

The McTear Continuous Tray Drier shows much promise of replacing all driers of current design. The special design of the continuous tray cuts air losses down to negligible levels thereby increasing the efficiency of the machine. It is claimed that up to 50% fuel saving may be expected. A commercial-size model equivalent to an ordinary six foot drier is in operation in the Hunwal Tea Estate factory and the results have been most satisfactory. A continuous fermentation machine which will couple directly with this drier is under construction at the present time and when ready it will be installed at Hunwal also.

One possible scheme for continuous manufacture is presented in Figure 1. However, other equipment was seen in use in Assam which might fit into other schemes. For instance, trough withering units are being tried out and these could replace the tunnels in the figure. In fact, trough withering may prove to be more acceptable than tunnel withering because of lower costs and perhaps better quality in the final product too. At Kakajan Tea Estate factory, 16 withering troughs of 1,600 lb green leaf capacity each are in use at the present time. In this installation the air for all 16 troughs comes from a single large bulking chamber. The results have been very satisfactory.

Also at Kakajan Tea Estate a linked rotorvane rolling and trough fermentation unit was seen in operation. This is shown diagrammatically in Figure 2. The

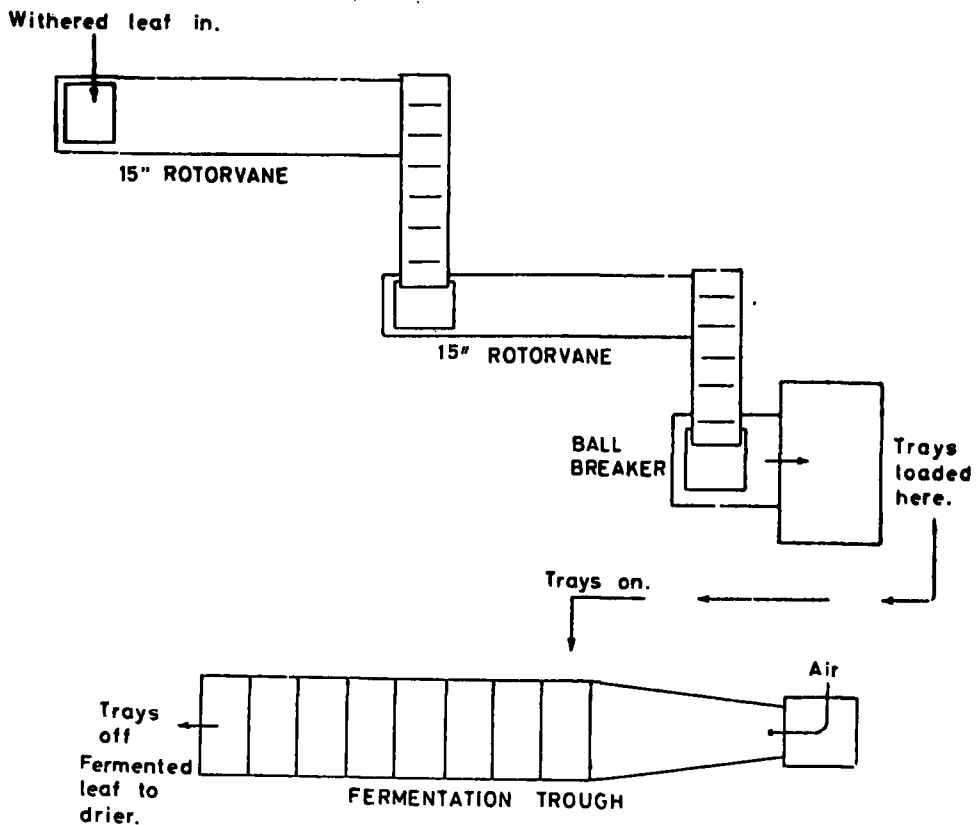


Figure 2. Diagram of Continuous Rolling-Fermentation Process using Rotorvanes and Trough Fermentation. This process is in operation at Kakajan Tea Estate in North-east India.

withered leaf is fed into the first 15 inch rotorvane by hand. From there it is carried by conveyor belt to a 15 inch rotorvane and finally into a ball breaker. The discharged leaf is put into trays with wire screen bottoms which hold 80 pounds of rotorvanned leaf. The filled trays are placed on to one end of the fermentation trough at the rate of one every five minutes. Trays are taken off at the other end of the trough at the same rate and taken to the drier. The fermentation is controlled by forcing air at room temperature through the rotorvanned leaf under low pressure. The discharge of leaf from the chain of rotorvanes is sufficient to feed the trough fermentation unit which in turn operates at the rate to feed a six foot drier.

The C.T.C. machine is almost universally present in Assam tea factories with approximately 80% of the Assam tea now being made with this machine, (See Keegel, 1962, for modes of operation). Careful C.T.C. manufacture results in teas which have very good strength, colour and quality. The appearance is markedly different from orthodox tea in that C.T.C. teas are flaky and reddish. However, the buyers have a set of standards for C.T.C. teas which are different from those for orthodox teas and in general it has paid Assam tea estates to switch from orthodox to C.T.C. manufacture.

It is important to emphasize that with all of these new or unorthodox techniques, timing becomes very critical. For instance, in switching from orthodox to C.T.C. any deficiency in the drying capacity of a factory immediately becomes apparent. Teas produced with the C.T.C. machine ferment rapidly and they must be fired at very near the optimum time or all advantages from this type of manufacture will be lost.

It is noteworthy that many of the Assam factories are much larger than the largest factory in Ceylon. For example, Hunwal factory has seven six foot dryers working continuously. The very size of these factories encourages automation.

With all his enthusiasm for novel methods of manufacture the Assam planter is also very much concerned with quality. A large amount of work is done on estates to ascertain the usefulness of new machines and techniques, and to determine the optimal conditions for their use. The Tocklai Experimental Station has had a great deal to do with the development of most of the newest machines and it works closely with the tea estates which are involved in commercial scale tests. The Tocklai Engineer, Tea Taster and Biochemist work together in these studies forming a very competent scientific team.

It has been found that chemical wither is essential to the production of the best quality tea. Chemical wither is dependent on time and not on moisture loss. Tocklai is now recommending that leaf be held at least 9 hours before beginning rolling, and preferably 18 hours, no matter how soon the required physical wither is obtained. Investigations on this subject are continuing.

The Biochemist and the Tea Taster at Tocklai are also carrying out very interesting investigations into changes in fired tea with time. Certain marked chemical changes have been established and the effect of these changes on the quality of the tea is being studied. It is expected that some interesting results will soon be available.

Ceylon conditions are markedly different from Assam conditions and the methods of tea manufacture used in Assam are not directly applicable in Ceylon. However, it is prudent for the Ceylon tea industry to take note of the changes taking place in Assam and other tea producing areas with the resolve to improve our practices when and where possible.

Acknowledgments

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