

WITHERING ON MATERIALS MADE OF SYNTHETIC FIBRE

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In the recent past, estate managers have had to cope with increasing crops and inadequacy of withering space on conventional tats. The question naturally arose whether it was more economical to enlarge factories or consider changing over to a different type of withering system, which would conserve space whilst accommodating the heavier crops being harvested.

Enlarging of factories has had to be ruled out on the question of prohibitive costs, and the adoption of new withering systems has involved some risk because of lack of practical experience in these systems by planters.

Fortunately, plastic mesh had been tested several years ago in the Institute and though proving successful, had been discarded due to high cost of the material. With the decline in prices, various types of synthetic fibre mesh have been under test for their wearing properties and suitability for withering tats.

Of particular interest were the characteristics of teas made from leaf withered on these materials. In a series of experiments conducted with Nylon net (4 meshes per linear inch) and Hessian, with equal rates of spread of approximately 1 lb green leaf on 8 square feet tat areas, it was possible to shorten the period of wither on Nylon tats by nearly 3 hours. Shortening of the withering period produced teas with improved quality, but a slight drop in colour was observed.

It is considered that the main purpose in substituting synthetic fibre mesh for hessian, should be to accommodate more leaf. The effects of thicker spreading of green leaf on made teas was investigated and for this purpose 50% more leaf was spread on synthetic fibre material. An analysis of tea-tasters' reports and our own observations indicated that there was no difference in the characteristics of made teas. We are, therefore, of the opinion that thicker spreading of leaf for withering has no detrimental effect on made teas, provided withering is carried out under satisfactory conditions; particularly in relation to volume of air supplied and distribution of air inside the lofts. We are also aware that certain types of open-mesh material could almost double the capacity of a loft and yet give a wither, which was much more even than that possible on hessian tats.

The use of synthetic fibre mesh provides many advantages over hessian for withering tats. Some of these materials could be expected to last much longer than hessian because of their tensile strength and type of weave. In this connection we recommend 6 ply interwoven mesh, though 4 ply mesh may be used, if preferred, provided the weave is reasonably close and the twines are thick. There has been some controversy regarding the merits and demerits of knotted and knotless mesh. Knotted mesh could be ruled out due to two factors. Under normal factory conditions it is more difficult stripping withered leaf from tats if knotted mesh were used. Also, a greater degree of abrasion between collecting sticks and knots could result in damage to mesh at these points.

If synthetic fibre mesh is correctly tensioned there is practicably no tendency for tats to sag as is the case with hessian. Even with very thick rates of spread, sagging of such materials was not very appreciable. It would be a natural deduction that withers should be much more even when withering tats do not sag.

The only factor against installation of synthetic fibre mesh is its cost, when compared with that of hessian. At present the cost is approximately twice that of hessian, but the extra cost is more than compensated for by increased durability, much lower maintenance costs and extra leaf accommodation.

With more leaf being accommodated on the new tats, it is absolutely necessary to increase the volume of air in proportion to the extra leaf to be withered in each loft. This could be achieved either by increasing fan speeds or fan size. The guiding principle in estimating fan capacity should be the maximum quantity of leaf accommodated in the lofts and not the size of the factory as is generally believed. For efficient withering in an average multi-loft factory with a central bulking chamber, air should be passed through four lofts on a reversible withering system. The size and speed of withering fans would be in relation to leaf in these four lofts. From withering tests carried out over the past 20 years, we consider that 10 cf.p.m. of air should be adequate for withering 1 lb green leaf. More air of course is desirable. It is possible that in certain factories there would be a tendency for leaf to be blown off tats closest to the bulking chamber. The best method of overcoming this problem would be to fit a variable speed unit to the withering fans. This would ensure accurate regulation of air in proportion to total crop and number of lofts through which air is to be passed. In the absence of variable speed gear, a method which is not very economical is to divert part of the air into an empty loft. Worthy of note is that irrespective of the volume of air supplied, area of the air exit must be at least equal to the area of the fan intake, if not greater. Installation of synthetic fibre mesh will not give the best results if these precautions are not taken.

The choice of material would depend upon individual preference from the wide variety of open mesh material available. From our observations we can now state that the smallest mesh size should be 5 meshes per linear inch and the largest, 4 meshes per linear inch. If material with more than 5 meshes per linear inch is used, it is very likely that airflow through the withering leaf would be retarded and if it is less than 4 meshes per linear inch, there would be considerable difficulty in gathering withered leaf, as leaf particles would be entangled in the net.

It was observed that conventional wooden leaf gathering sticks have a tendency to damage mesh, as quite often the sticks break whilst in use, exposing sharp edges. It was our opinion that plastic sticks would prevent such damage and it is encouraging to note that a leading firm of engineers has put on the market plastic leaf gathering sticks, which we recommend.

The belief that the centre supporting wires in a bank of tats should best be excluded when synthetic fiber open-mesh materials are in use, in order to minimise damage to the material at this point of greatest friction, was tested. It would seem that if all tat wires after tensioning are adequately protected by a covering of hessian or other suitable material which is anchored to the wires at intervals of 5-6 inches by twine, such damage is unlikely. Plastic wire covers, when they soon become available, will further simplify matters. The use of open-mesh material without the centre wire may impose undue strain on the other supporting wire, and lead to sagging of tats with thick rates of spread.

The recommended rate of spread is 1 lb on 7 sq ft tat area, but it is possible to achieve good withers at a very thick rate of spread of 1 lb on 5 square feet tat area. Thick spreading could be permitted if more air is supplied, but the minimum recommended spacing of tats is $4\frac{1}{2}$ inches apart. Better withers could be achieved if tat spacing is 5 inches.

Installation of synthetic fibre mesh could cause problems depending on the type of mesh used. Stretchable mesh, when fully tensioned, imposes a severe strain on the framework and banks of tats require reinforcement. Pre-stretched mesh causes no problems.

As these synthetic fibre materials were non-absorbent, it was feared that spreading wet leaf on such tats would result in moisture dripping from upper tats to ones below, thus causing uneven withers. Experiments, however, indicate that there was no difference in wither of initially wet leaf in the upper and lower sections of a bank of tats. The retention of water by leaf layers was so efficient that negligible amounts of water dripped to the bottom of a bank even when leaf dipped in basins of water was spread on all tats in a bank. Also, the removal of free moisture was considerably easier from the open-mesh material than from hessian tats. Hence, there should be no misgivings that the use of synthetic fibre mesh would result in uneven withers or rotting of floor boards under banks of tats.

Open-mesh materials with names such as Kuralon, Nylon, Tetoron, and Ulstron are available and though their tensile strengths differ, durability of the mesh would be dependent on the thickness and number of fibres in each twine, the number of twines woven together and the type of weave. In the case of Fibre-glass, though its tensile strength may be superior to other materials, the glass fibres tend to detach quite easily with abrasion, constituting a danger to health.

The following are some of the types of open-mesh material tested at the Institute, and these can be recommended in so far as they satisfy certain minimum requirements:—

<i>Type of Material</i>	<i>No. of meshes per square inch</i>
Kuralon (Pre-stretched)	25
Nylon	16
Tetoron Terylene	16
Ulstron	16
Tevilon	16

As was to be expected from such inert materials, there is nothing to choose between materials provided they conform to recommended specifications. It is evident that replacement of hessian tats with the new types of open-mesh material would not only help to solve the problem of coping with increasing crops, but would achieve evenness of wither under correct conditions.