

stamina, however, of the plant is of the most enduring nature; it grows to great perfection amid the snows and cold of northern latitudes; it maintains a healthy condition in a warm climate of Southern Europe, and even in the sultry lands of Egypt it stubbornly survives." For coolness and comfort in hot weather, a fine linen garment is not excelled by any fabric made of vegetable or animal fibre; while in the sick room it has been traditionally valued from the time of Moses. No textile has been in so regular demand, and kept up its value so well the world over. So much for the permanency of the industry.

If flax is grown for seed only, it is sown thinly, so that when the stalks are up they will branch out and develop a greater quantity of seed bolls, but the fibre of such branchy stalks turns largely into tow when handled. If sown for the express purpose of fibre, put in from two to three and one-quarter bushels of seed to the acre. Let the seed be clean, and if it is changed every year it is all the better. In Belgium and Ireland farmers buy seed from some foreign country, largely from Riga, Russia, fresh every season. Generally speaking, a soil that will grow a good crop of turnips will grow a good crop of flax. It will do well to follow oats or wheat. The ground should be well drained and plowed deep so that the roots may penetrate well and draw moisture and strength from a considerable depth below the surface. The land, however, should not be ridged up, but plowed flat. When grown in ridges, it is of uneven length and often needs two pullings. Sow when the danger of spring frost is over, and when sown harrow in. When the flax is 3 or 4 inches high it should be weeded. The Belgian farmer weeds on his knees, and works against the wind, so that the wind may raise the tender plant up again after he has passed. Weeding should be done when the ground is damp. A warm, showery climate is best for the growing flax. The proper time for pulling is when the stalk near the ground has become a pale yellow, and leaves have fallen off eight or ten inches above the ground, the higher seed bolls have turned brownish, and the seed itself has a pinkish shade. If pulled too young, the fibre will be tender, and there will be loss in scutching, and if allowed to stand too long it will make a coarse fibre. To pull, take a handful of stalks just below the bolls and give it a jerk. The handful should be of stalks the same length, and where there are different lengths, they should be kept in separate "beets" or sheaves. As each handful is laid down to form a beet, it is slightly crossed over the last to prevent entangling.

In Belgium, where flax raising is carried out to great perfection, and a remarkably fine fibre is produced, much economy is observed in all the details, and it is this economy and their patience in weeding, etc., much of the work being done by women and children, that enables them to produce the material so cheaply. There all the seed is saved, while in Ireland it is allowed to waste.

The beets being bound up the seeds are taken off in a comb, the teeth of which are generally of round iron spikes, bolted to a plank. This is called rippling, and can now be done by improved machinery. If it is desired to save the seed, it should be dried in lofts or in gently heated kilns. In Belgium, when the flax is taken off it is put in shocks or "stooks," as here illustrated. This is done instead of first tying it into sheaves, as in Ireland. After it has dried enough, it is then put up into "hedges," where it remains till sufficiently dry to be stored in barns to be retted in the following spring.

In the district here referred to—Courtrai, which is famous for the fineness of its fibre—the seed is taken off by means

of a mallet, with which the beets, being placed on the floor, are pounded.

After threshing, two beets are tied together, which is bound with straw bands, the tops and butts being reversed. The bundles are placed in crates of wood, lined with straw to modify the current, and these crates are floated in the river and tied to the bank by stakes. The crates are submerged by stones put on boards over the straw lining. When the flax has reached a certain stage of fermentation, it is taken out and dried in cones.

Then it is repacked and put in the river till the fermentation or "retting" is completed. These stages are determined by delicate tests, which can only be thoroughly understood by experience. Previous to scutching, it is sorted by a manipulator, who opens each beet and sorts out what is perfectly retted, that which is over-watered being scutched separately, and that under-watered being put in the water again till properly softened. In Holland the process is carried out with the same care as in Belgium, but the flax, as pulled, is tied in beets and stooked, as here shown, and the retting is done in stagnant ditches as in many parts of Ireland. This is afterwards dried on the grass or in cones. For the steeping of the flax in Ireland, the secretary of the Flax Supply Association gives the following tests: "After a few days the flax must be examined. Take a beet or two and examine. If glit appears in the middle of the beet, and it feels soft when grasped, it is an indication that great watchfulness is necessary. Take three or four reeds, which will be found covered with a slimy substance, and if this can be removed from the surface by delicately passing it through the finger and thumb, it is in condition to leave the dam; or bend the reeds gently over the forefinger, and if the woody part separates freely from the fibre and starts up, it is time to throw it out. If the middle of the stalk yields to the latter test, it may be safely considered watered. When you commence to examine do so daily or twice a day. When you are satisfied it is retted, take off the stones and throw it on the bank, allow it to drain out, then cart to the spread ground." Here it is spread in layers that slightly overlap each other, dried, made up into beets and stacked for the scutch mill.

(To be continued.)

### WATER: ITS IMPORTANCE IN DYEING AND PRINTING.\*

Water is one of the most important factors of the dye-house. Not only in washing and bleaching, but also in the operations of dyeing and printing, is successful work more or less dependent upon the quality of the water employed. Years ago, when the woods were the sole coloring matters, and before the science of chemistry was thoroughly understood, it was the custom to wash or scour goods directly in the river, which, of course, on account of the impurities often present, had a very injurious effect both on the dyeing and bleaching, and it became a well-known fact that a dyer learning his trade in one town would result in a total failure in another where different water was used.

Every dyer, even those who profess to have but little knowledge of chemistry, should at least be able to make such few simple tests as are necessary to determine the character and approximate amount of impurities present in the water he uses. The lime salts in 1,000 gallons aqua will destroy 1.7 lb. of the best hard soap for every degree of hardness, which is all clear waste; besides, the insoluble curd, on ac-

\* A paper by D. L. Malcolm, read at the Philadelphia Textile School.