I would empasize the rules—cut only when the clover is dry; cut only a small piece at a time, and do not cut on Saturday. H. C. GRAHAM.
Middlesex (North) Co.

## Harvesting Operations.

To the Editor FARMER'S ADVOCATE:

SIR,—As the prospects for a good grain crop are promising, it should be the effort of every farmer to conduct the harvesting operations so as to secure the best results in the product. Care should be taken not to allow wheat to fully ripen before cutting it. Both for milling and for seed a greater weight is secured, as well as the maximum vitality and milling quality, by reaping the crop just when the grains have reached the dough stage and the straw is ripe near the ground. When the field is clean of weeds and contains no green spots we consider it of no advantage to select seed from any particular portion of the field.

When oat straw is used for feeding it is advantageous to cut the crop quite on the green side, as then the straw, if well saved, will contain enough nutriment and freshness to be much relished by stock; at the same time the grain will fill almost to the maximum and not have as thick hulls.

Peas cut with the scythe in the old way and rolled into bunches lose very little by shelling. Owing to the openness of the straw it is not wise to stack them. We always draw to the barn and do not thresh them till late fall or winter. When the straw is used for sheep feed, for which it is valuable, we prefer to thresh a little at a time so as to always have fresh straw.

ROBT. ROBERTSON, Supt.
N. S. Expl. Farm, Nappan.

## Harvesting in New Brunswick.

To the Editor FARMER'S ADVOCATE:

SIR,—Although the spring opened wet and cold in this section, yet at this writing all grain crops are looking well, and hay crop especially seems well advanced for this season. As to the proper mode of harvesting wheat, there is a great diversity of opinion among farmers in the Lower Provinces. My own experience has taught me that wheat, in order to make good flour and a good quality of bread, should not be allowed to stand till the grain gets hard without being cut, as many do. The proper time, in my opinion, is to cut the grain just as soon as the milk in the kernel gets dry, and before the grain begins to get hard; then, having the grain cut and properly bound in sheaves, put it in stooks, cap well to prevent grain from being spoiled or discolored by rain or dull weather; then, after the sheaves have stood in stook till grain has become thoroughly cured, put the grain in the barn, and it is then ready to thresh at any time. By cutting the grain at this stage of ripeness, and harvesting as I have said, a better quality of wheat is secured, which will make a good, light, wholesome bread. Should the grain be allowed to stand without cutting till kernels become hard, the flour will be darker and drier, and the wheat much more shrunken.

In harvesting oats here, where so much straw is fed to cattle during the winter, I would cut the grain with a binder, a little on green side, then stand grain in stook and allow it to stand till thoroughly dry before putting in barn. Straw from oats which have been allowed to stand till the grain is dry and hard is almost useless to feed to cattle, in fact they will rarely eat it.

M. H. P.
King's County, N. B.

## Moisture as a Protection from Frost.

Prof. Huston, Chemist at Purdue University, Indiana, writing on the protection of crops from frost, says: "The direct loss from injury due to frost is of considerable importance. We hear most frequently of damage to fruit buds in the spring, and the damage to the peach crop has become a standard joke for the funny man. The loss of early garden crops receives less attention, but if the total were known it would reach quite a respectable figure. Both spring and fall frosts often injure the corn crop to the extent of many thousand bushels.

"Water is the best protection from frost. The air always contains some water vapor, and the warmer the air is the more water vapor it can contain. At 50 degrees a cubic foot of air might contain four grains of water vapor, and usually contains about three grains. When the air cools, a point may be reached at which it cannot hold up all the water which it contains. If this is above the freezing point, some of the water vapor is deposited in the form of dew. But when the water changes from water vapor to liquid dew, a large amount of heat is given off and this prevents a further fall of temperature. But if the air contains so little water vapor that it can cool below the freezing point before the water begins to deposit, the water is deposited in the form of ice crystals and we have a frost. A moist air, then, is a protection from frost. The frequent shallow cultivation that saves soil moisture will at the same time keep the air above the soil more moist, and will to some extent serve as a protection from frost. Dr. Kedzie quotes a circumstance where a recently cultivated corn field was not injured by a frost that cut down the corn on surrounding fields.

"A more direct and effective way of protecting plants from frost is to irrigate the land or to sprinkle the plants with water at the time the frost is expected. In this State few farms have means of irrigating in the usual way. But there are many farms on which fruits are sprayed, and the spraying machinery may easily be used to sprinkle plants with water to protect them from frost. This method has proved practical and profitable on a variety of early spring crops."

## Plant Fertilization and Seed Production.

All plant seeds are produced from flowers. The flower usually contains two sets of organs—the sexual and the enveloping. Sometimes the latter are partially or wholly wanting, but the sexual organs—the stamens and pistils—must be present either in the same or in different flowers in order that the plant may be fruitful. The envelopes usually consist of two sets or whorls, and are shown in Fig. 2, at *a*, *b*. The pistil consists of the ovary at the base, the style and stigma at the end (Fig. 2, *e*, *f*, *g*). The stigma is the receptive surface on which the pollen falls, and is connected with the ovary by the style. In Indian corn the silks are the styles. The stamens or male organs are located between the pistil and the envelopes. (Fig. 1, *d*; Fig. 2, *d*). A stamen consists of a stalk or filament and an anther. The anther produces the pollen, the fertilizing element, seen in a mass of dust usually of yellow color, and consists of a countless number of pollen grains. When ripe the anthers open and the pollen is exposed, to be carried away either by the wind or by insects or other animals.

FIG. 1.—Tomato flower—a, calyx; b, corolla; c, pistil; d, stamens. (Peters' Division of Botany, U.S. Dept. of Agriculture.)

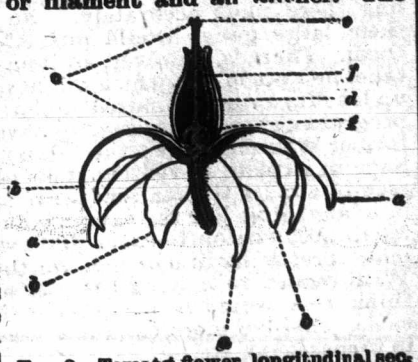

FIG. 2.—Tomato flower, longitudinal section—a, sepal; b, petal; c, pistil; d, stamen; e, stigma; f, style; g, ovary. (Peters' Division of Botany, U.S. Dept. of Agriculture.)

In the majority of plants both sexes are present in the same flower; in a small number they are in different flowers, either on the same plant or on different plants. In the latter case the female plant only produces seed, and then only after fertilization by the pollen of the male plant. This is accomplished by the pollen grains falling on the stigma of the pistil, when they burst and their contents are conveyed to the ovules in the ovary (Fig. 3) by means of pollen tubes, which grow out from the pollen grains and extend down through the styles. After fertilization the ovary rapidly develops into the fruit (Fig. 4).

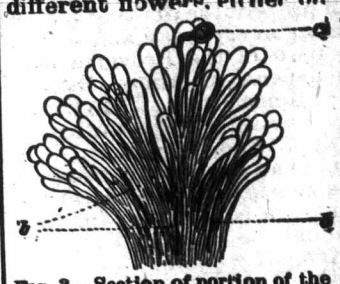

FIG. 3.—Section of portion of the stigma of the cucumber, showing a germinating pollen grain—a, pollen grain and tube; b, portion of pollen grain. (Peters' Division of Botany, U.S. Dept. of Agl.)

*Cross and Self Fertilization.*—The matter of fertilization underlies the whole subject of seed production, for on the fertilization of the seed depends the purity as well as the vigor of a variety. A flower is cross-fertilized when its ovules are impregnated by the pollen of another flower; self-fertilized when they are impregnated by pollen from its own stamens.

Among the many adaptations for cross-fertilization, the two great external agencies are the wind and insects. Insects visit flowers for the sweets they find, and are undoubtedly attracted by color and odor. While collecting the honey, insects are dusted with pollen, which, passing to other flowers, they deposit on their stigmas. Many flowers are so arranged that only bees and insects large enough to pollinate the flower can obtain the honey. The peculiarities of structure are numerous and varied. A common type is found in the flower of the pea family; for instance, in that of red clover (*Trifolium pratense*). The flowers are visited by the bumble-bee, whose long proboscis can reach into the tube at the bottom of which the honey is secreted (Fig. 5). Smaller bees cannot secure the honey, but they collect pollen, and doubtless aid in fertilization while so doing. The stigma stands out above the anthers, and a bee thrusting her head into a flower would first brush against the stigma, leaving some pollen from a flower previously visited, and thus dust herself afresh with pollen, to be carried in turn to the next flower (Fig. 5).

FIG. 4.—Pod of common bean. This is the ripened pistil. (Peters Division of Botany, U.S. Dept. of Agl.)

FIG. 5.—Bumblebee pollinating red clover—a, stamens and pistil of flower; c, proboscis of the bee. (Peters' Division of Botany, U.S. Deptartment of Agriculture.)

Owing to the scarcity of bumblebees during May and June, the red clover blossoms are seldom fertilized, hence the failure of the blossoms of the first crop to produce seed. Later in the season bumblebees become more plentiful, and in gathering honey cause the fertilization of the blossoms of the second crop, from which a good yield of seed is usually secured when not interfered with by weevil and other enemies. It is claimed that bumblebees had to be imported into Australia before red clover seed could be raised there.

In the cabbage family arrangements are such that self-fertilization can take place if cross-fertilization fails. In cabbage blossom honey is secreted at the bottom of the corolla tube. An insect sucking the honey would touch the stigma and the anther of one of the short stamens. At the next flower the pollen thus collected would most likely be deposited on the stigma. In case cross-fertilization fails the long stamens bend over and pollinate the stigma. It is known that cross-fertilization does frequently occur, by the difficulty of keeping varieties of cabbage, turnips, etc., from mixing.

In pumpkins, squashes, cucumbers, and melons, the male flowers appear first, followed by the female (Figs. 6 and 7). Here cross-fertilization is inevitable, and mixing invariably occurs when several varieties of a species are grown near one another. The grasses, corn, wheat, oats, barley, etc., having flowers without odor, nectar or conspicuous color, do not attract insects and are fertilized by the wind.

FIG. 6.—Male flower of cucumber, one petal cut away to show the stamens—a, sepals; b, petals; c, stamens. (Peters' Division of Botany, U. S. Department of Agriculture.)

As has already been said, the purity, as well as the vigor, of a variety depends upon the fertilization of the seed. While cross-fertilization has been clearly shown to be productive of more vigorous plants, and therefore a benefit so far as the life of the species is concerned, there are other considerations of vital importance to the seed-grower. The first of these is purity of variety. No matter how well the seed germinates, nor how vigorous the plants, if they are not of the variety wanted the crop is at best a partial failure. While crossing between plants of the same variety is beneficial—the more so if their ancestors were not grown under the same conditions—crossing between the varieties of a species should, as a rule, be guarded against. Intelligent crossing of varieties, or of species even, may lead to good results, but indiscriminate crossing can only result in the loss of well-established types.

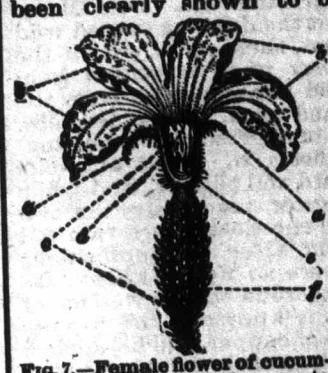

FIG. 7.—Female flower of cucumber, one petal cut away to show the stigmas—a, sepal; b, petal; c, pistil; d, stigma; e, style; f, ovary. (Peters' Division of Botany, U.S. Department of Agriculture.)

## Increase Wealth by Saving It.

Mr. T. B. Terry writes a common-sense article for the *Practical Farmer* upon the subject of housing implements, from which we offer a cap to many of our readers who can wear it. The observation is made that if implements and tools were left out during the winter or even a part of the time in summer, when not in actual use, they will soon have to be replaced. It is a sad fact that most farmers who leave machinery and tools outdoors are hardly able to stand the loss, while they are quite forgetting that it is this loss, among others, that is keeping them poor. Mr. Terry instances a case of a wooden-framed harrow which, although not as old as one of his own, which is quite sound, was so rotten that it was liable to give out at any time, simply because it had not been housed, while Mr. Terry's had never been allowed out except during the season in which it was in use. On the same farm was noticed a number of more costly tools, not more than from three to five years old, that were so rusted, rotted, and out of shape, as to be of little value. It is not wise to buy new and improved tools and implements and not provide a place of shelter for them. Mr. Terry refers to his manure spreader, which he bought 16 years ago and which is practically as good as ever; and the secret is that it has not been allowed to stand