

The Farmer's Advocate

and Home Magazine

"Persevere and Succeed."

Established
1866.

REGISTERED IN ACCORDANCE WITH THE COPYRIGHT ACT OF 1875.

Vol. XLIV.

LONDON, ONTARIO, MARCH 18, 1909

No. 860

EDITORIAL

Systematic Cropping.

A definite system of crop rotation is necessary for best results on any farm, yet vast areas are annually cropped after a hit-and-miss fashion—now a crop of oats, then barley, then corn or roots, followed, perhaps, by wheat or barley seeded down. In from three to eight years, or perhaps after a longer interval, when the field has ceased to cut a ton of hay to the acre, it is again broken up, and another siege of cropping commenced. On other farms system is followed, but very often the system is improvable. Among the more serious mistakes observable are leaving arable land too long in sod, cropping too many years in succession to grain, putting oats on inverted sod and corn on stubble, and similar inversions of correct practice.

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While conditions do not admit of the same rotation being adopted to advantage on every farm, there are a few fundamental principles which all should seek to observe. The main objects of rotation are to economize plant food, to maintain or increase the supply of humus in the soil; to prevent the accumulation, in injurious amounts, of toxic properties; to provide opportunity for cleaning the land of weeds, and to produce maximum crops. Let us discuss these briefly, in order.

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It is a well-known fact that plants of various kinds differ in the demands they make upon the several elements of fertility in the soil, as well as in the power of their roots to take up these constituents from the soil. To follow one crop with another of like-kind, or of similar character, as to sow one cereal after another, is to fail to utilize plant food to the best advantage, or in the largest possible amounts. The unutilized excess rendered available in the course of a season is subject to waste, particularly in the absence of abundant quantities of humus. Humus is decayed plant tissue. Humus in the soil possesses the virtue of a sponge. It increases the capacity of the land for holding moisture and plant food, and also affords material for the soil bacteria which render plant food available. A soil without humus is dead, inert and unproductive. Cultivation and soil processes are constantly breaking up the humus into elemental forms. A rich, new ground mold, cropped for a few years with grain, soon becomes an entirely different-looking kind of soil. In order that the humus supply may be maintained in ample proportions, not only must reasonable quantities of barnyard manure be applied, but crops, such as grass and clover, must be grown which, when removed, and the field plowed, will leave in their residue of stubble and roots large quantities of plant tissue.

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Market gardeners, who use manure lavishly, nevertheless find their land benefited by thus filling it with fibrous plant tissue, while those who depend upon commercial fertilizers alone have still greater need to seed down their land from time to time. The fact is that frequent seeding to meadow is absolutely essential for the economic maintenance of the humus content of the soil, without which the land would soon become leachy, incapable of retaining either plant food or moisture. It is, furthermore, important that the meadow seeding should consist largely of clovers, in order that the somewhat scanty nitrogen supply of the soil may be supplemented by the addition of such quantities as may be abstracted from

the air by means of the bacteria inhabiting the nodules on the roots of leguminous plants.

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The third reason for rotation named, viz., to prevent the accumulation of injurious toxic properties in the soil, is somewhat problematical, but yet may be properly noted here. Recent researches by investigators at Washington appear to indicate that the roots of growing plants exude certain toxic properties inimical to a following crop of the same kind, though not usually injurious to another crop of different kind. In the course of a year or two these toxins are reduced in quantity to a comparatively harmless percentage, after which a full yield of the original crop may again be grown. However this may be, it offers one more hypothesis to explain the marked advantage that has often been noted from change of crop.

Of course, no intelligent farmer will dispute the need for a summer-cultivated crop to combat weeds.

The fact is that many unsystematic croppers dissipate and waste much more fertility than they convert into crop, while the farms become worse and worse infested with weeds. Researches on the wheat lands of the Western prairies revealed that annual cropping with wheat for many years depleted plant food in the soil out of all proportion to the amount harvested in the form of crops.

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We perceive, therefore, several strong reasons for rotation of crops. A word now as to the order that is best to follow. There are two main classes of farm crops: First, vegetative crops—that is, those grown to provide fodder by their stalks, leaves or roots; secondly, those grown to produce seed or grain. The former class must be subdivided, for cultural purposes, into those such as corn, roots and potatoes, on the one hand, and grasses and clovers on the other. Necessarily, the latter follow the grain crops with which they are seeded. All that remains, then, is to decide the order of the others. The corn and root crops, having a long season of growth, and requiring, as they do, abundance of nitrogen and potash, are especially adapted to follow sod, as they revel in the rich mold resulting from its decay, and their prolonged growth into the latter part of the season enables them to make the most out of the decaying sward. The grain crops, on the other hand, demand a fine state of tilth at time of sowing, abundance of nitrogen and potash in the early stages of growth, and phosphoric acid to mature the seed. These conditions are best met by putting corn, roots, potatoes and soiling crops after sod, following these with grain seeded down, the land to be left one or two years in sod. If one does not wish a third or a quarter of his arable land in hoe crop, he can fill out this section to advantage with peas, after which wheat may be sown without interrupting the series. By alternating the area on which the peas and hoe crop are grown, he may have all the advantage of a six year or eight-year course, with the simplicity and convenience of a three or four-year one. We are well aware that many will object to putting roots after sod as being impracticable. The objection may hold in the case of tough old sods, but a clover sod of one or two years' standing, if well worked down, may be reduced to an ideal seed-bed for roots, while, for corn, a sod is admittedly the best preparation.

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The ideal rotation is the three-course system, embracing either three or four years, according as the land is left one year or two years in sod. It

is an effectual means of cleaning the land; is, on the whole, the best means of circumventing damage by insects, and is a means of securing maximum crops and liberal profits; while, if the manure is carefully saved and applied, the land will become more productive with passing years. Land not adapted to work in such a rotation, should be, in most cases, planted to trees, or seeded to alfalfa or permanent pasture.

Make the Bridges Large.

Among the many valuable features of the recent convention of the Ontario Good Roads Association, the construction of culverts and bridges was given due consideration. The importance of sufficient capacity for full-flood was urged. It was evident, from the tenor of addresses given by those prominent in good-roads work in different parts of the Province, that, just as steel structures took the place of bridges made of wood, so will cement take the place of steel for bridges, and of wood for culverts.

No matter what material is used, however, the question of capacity remains paramount. It is not sufficient that a span be large enough to carry the waters of a stream when it is swollen by days of heavy rain. It must be wide enough and deep enough to allow the swollen waters of a spring thaw and rain combined to pass through. In many instances, the curtailing of initial expense, by reducing the size, has, in the course of a very few seasons, resulted in increased cost to the municipality, because the flood, during the spring freshet, could not pass through, and the consequent blocking of ice and debris, by causing a washout, carried the structure from its foundation. In other cases it may be that the current never becomes sufficiently strong to dislodge the culvert or bridge, but the damming of the waters causes disgraceful and dangerous washouts on either side of the structure, entailing almost annual expenses for repairs.

In order to ascertain approximately what capacity is required, those in charge of road construction in the various sections should be on the alert when floods prevail during the spring months, and make careful estimates of the volume of water that flows where new bridges will be a necessity within very few years. When ample allowance has been made for the largest freshet, it would be well to add ten or fifteen per cent., or perhaps more, when preparing plans.

Lost Time on the Roads.

There are, in every district where statute labor is still in vogue, many who unhesitatingly declare that the annual call to "road-work" duties means the loss of so much time. Few, however, take into account the time that is lost on highways because of being in poor condition. If those who are most interested in roads throughout rural Canada would consider that road repair and the keeping of highways in proper condition was an insurance against loss of time, perhaps there would be less difficulty in arranging for funds to meet expenses. Not only is it an insurance against loss of time, but also the wear and tear on harness and vehicles is reduced to a minimum. A consideration of these facts, also, should result in more satisfactory work, even in localities where statute labor is the practice.

Most farmers, in buying or selling, are very mindful of dollars and cents. In general lines, however, where a saving of time could be made, or where horseflesh or implements can be given a longer life or duration of usefulness, the economic standpoint is pushed to one side because of the