THE CANADA FARMER

Vol. IV. No. 15. | TORONTO, CANADA, AUGUST 1, 1867. | Postage Free.

The Field.

Germination of Seeds.

The time during which seeds will retain their vitality varies extremely in different species, and under different conditions. Freshly gathered seeds only just ripened, will in general vegetate quickly, but if they have become hardened and dried they are often started into growth much more slowly, yet will remain alive for a long period.

Fig. 1. Fig. 2. Fig. 3.

Some seeds, says Dr. Lindley, will retain their germinating powers many years, in any latitude, and under almost any circumstances. Melon seeds have been known to grow when 40 years old, maize 30 years, rye 40 years, the sensitive plant 60 years, kidney beans 100 years, and clover will come up

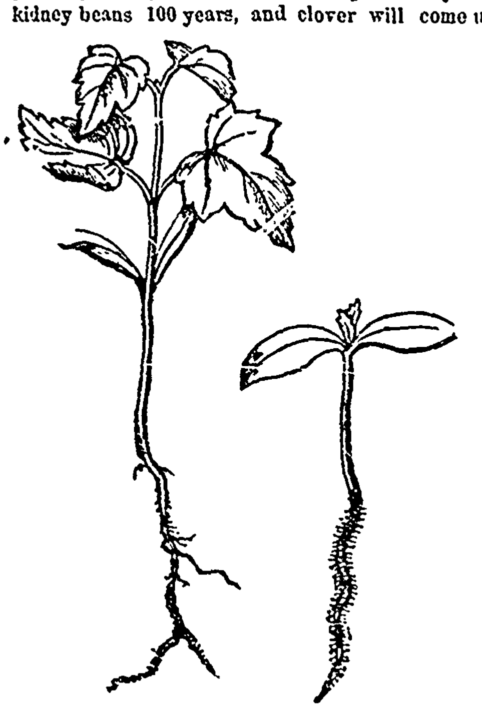

Fig. 4. Fig. 5.

from soil newly brought to the surface, in places where no clover had been previously known to grow in the memory of man. The same authority mentions an instance of raspberries which had been raised "from seeds taken from the stomach of a man whose skeleton was found 30 feet below the surface of the earth, at the bottom of a barrow which was opened at Dorchester (England.) He had been buried with some coins of the Emperor Hadrian, and it is therefore probable that the seeds were sixteen or seventeen hundred years old."

The conditions necessary for the germination of the seed are water, heat, and air, (or at least oxygen.) Darkness is also favorable, though not, like the other conditions, essential. The effect of water is to soften the seeds, causing them to swell, and dissolving the soluble part of the nourishment prepared for the young plantlet. The chemical agency of oxygen is also necessary to the process; and hence seeds immersed in water that has been *boiled* (from which therefore the free oxygen has been expelled) will not germinate. The oxygen combines with a portion of the carbon contained in the seed, forming carbonic acid, which is liberated. This chemical combination is attended with the disengagement of heat; hence the elevated temperature of masses of barley in the process of malting. The oxygen, besides, plays an essential part in the conversion of the starch of the seed into sugar, which thus becomes soluble, and fit for nourishing the young plants. The amount of heat required for the process of germination varies very much with the species; for while some will germinate at a temperature very little above the freezing point of water, it requires in others a temperature of 100° to start the seed into growth. Each seed shoots into most vigorous growth when exposed to just that amount of heat most suited for itself. If the temperature is too high, growth is stimulated too rapidly, more rapidly than nourishment is furnished, or can be properly assimilated, and a weakly plant, too much excited and insufficiently fed, is the result. If the temperature be too low, the excitement is not sufficient, and the water that has been imbibed will induce decay instead of germination. The variety of temperature required for different seeds explains why it is impossible to make some seeds grow in certain latitudes. The seeds of barley, wheat, and some other cereals, it is found, would be killed by a temperature as high as that which the surface of the soil acquires in tropical regions.

Exposed to the combined influences of water, heat and oxygen, which soften and dissolve the store of food, and stimulate the life principle inherent in the seed, the tiny plantlet which, as we have seen, existed, ready formed in the embryo, begins to develop and grow. The gradual change is well seen in the common maple of our own woods, where the seed consists of embryo and covering only. First the cotyledons are coiled up as compactly as possible within the seed-coats; gradually they unfold and increase in size, the tiny stem lengthening also, and carrying them above the surface of the ground, where they expand fully, and under the influence of light assume a green colour. The plantlet thus begins to eliminate fresh nutriment from the air, while at the opposite extremity the tiny radicle has penetrated into the soil, and thence absorbs its appropriate food.

In the accompanying illustration, Figure 1 represents the embryo of the sugar maple, as coiled up within the coats of the seed, there being no albumen. Figures 2 and 3, represent the gradual development of the same seed. From between the two seed leaves, we next observe the growing point extends upwards and develops another pair of leaves, more like the ordinary maple leaf. Between these again, the terminal end shoots still up, and forms

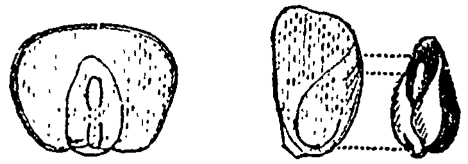

Fig. 6. Fig. 7. Fig. 8.

another joint of the stem, with another pair of fully developed leaves. In the meantime the root has continued to ramify below, just in proportion as the stem has increased above ground. Figures 4 and 5 illustrate the successive stages of this growth. The subsequent history of the young plant consists in a

Fig. 9. Fig. 10.

continuous repetition of the same process, *i.e.*, the formation of fresh buds, stem joints and leaves, the lateral extension being attained by the formation and subsequent growth of leaf-buds at the junction of each leaf with the stem, the axil of the leaf, as it is called.

In the class of plants whose seeds have only one