The conditions which control the growth of seeds are, the presence of air, moisture, and warmth; and, to produce healthy germination, all are required in definite proportions. When seed is protected from these agencies it will retain its powers of growth for long periods of time. Thus, wheat, preserved in Egyptian mummies between 3000 and 4000 years, has, after the lapse of time, germinated and produced a large increase. The preservation of the power of growth is entirely dependent upon the soil being kept from those agencies which would excite its vital energy,—moisture is the first essential for germination, as it is in consequence of the chemical action excited in the seed by the entrance of water that the seed is aroused to action; and after this process of growth has been excited, if it become checked, it cannot be renewed. This shows the necessity of keeping seeds dry when they are not required to germinate. Moisture alone is not sufficient for the process of growth, as the seed requires a supply of atmospheric air to enable the necessary chemical changes to proceed. Stagnant water in the soil must of necessity be unfavorable to germination, because it renders the land cold, and excludes the free access of air, both of which conditions are prejudicial.

The exceptions to this rule are very few; one, however, may be found amongst agricultural seeds in the floating sweet water-grass (*Glyceria fluitans*), grown in water meadows, in which instance immersion in water is absolutely necessary for the growth of the seed. In this case we have a seed which has the power of extracting its supply of air from water,—a power which very few other seeds possess. The supply of air is as necessary for these aquatic seeds as for any others; for if we drive out the air from water by boiling, they can no longer germinate. For the same reason, seeds which are buried deeply in the earth remain there for many years, not because they want moisture, but because it is unaccompanied by the presence of atmospheric air. The earth raised from wells, or brought from railway cuttings, or ploughed up by a furrow of extra depth, often becomes covered by a growth of vegetation, the produce of seeds which have long been dormant in the soil.

Warmth is another essential condition of germination, which, within moderate limits, is rendered more rapid by an increase of temperature; but it must be accompanied by a proportionate increase of moisture, otherwise it becomes destructive. The action of heat promotes chemical changes in the seed, but a free supply of water is necessary, not only that it may exert a like chemical influence, but also because it enters largely into the most delicate body into which the dry matter of the seed has to be transformed. Thus we see that healthy germination depends upon the combined action of the three agents—heat, water, and air.

The opinions which are entertained respecting the influence of light are conflicting. Some consider that light retards the process of germination, whilst others consider that it does not influence it prejudicially. The experiments which have been made, although far from conclusive, are calculated to favour the former opinion; for the growth, although equally perfect, has not been so rapid under the action of light as when the seed has been covered from it. We know that, as soon as the seed has made sufficient growth to throw out its leaves, the action of light is favourable, its presence enabling the plant to decompose carbonic acid and to retain the carbon for its own, whilst the oxygen is thrown off into the air. But at this earlier stage of existence,—or, in other words, during the period of germination, growth is favoured by an action *just the reverse* of this. The seed and its sprouts want to absorb, not to throw off oxygen, and to exist instead of taking in carbonic acid. During germination, then, the action would tend to paralyze the vital powers of the seed, and limit its growth to the hours of darkness instead of allowing the development to be continuous. Another great advantage gained by covering the seed is the more equable supply of moisture which is preserved beneath the surface, as well as the better opportunity afforded to the roots for firmly fixing themselves in the soil. Those who are practically engaged in conducting the operations of the farm or garden may gain much insight into these interesting but somewhat intricate matters, by frequent and accurate observations, from the sowing of the seed, through all the successive stages of its development to the perfect maturing of the crop, and comparing the results obtained with the principles laid down by the teachings of chemical and physiological science.