

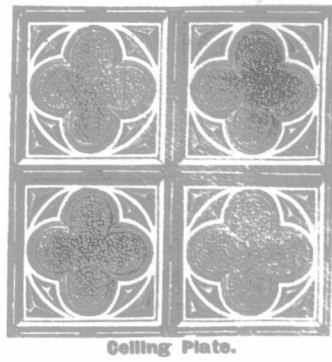
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WHY HEATING TAKES PLACE IN STACKS.

The term "heating" signifies the evolution of heat which may be very sensibly felt by any one who plunges his arm into the shoulder in an affected stack, or be visibly perceived by the vapory cloud to be seen issuing from the top. This "heating" is in reality a form of "fermentation," but differs from true fermentation in this respect that the latter term is chiefly confined to chemical changes effected through the action of micro-organisms or their products. The precise cause of this change which takes place in the compressed heap, and the considerable rise in temperature that accompanies it, was for a long time a subject of much speculation, and numerous theories were put forward by way of explanation. The idea that the work of bacteria

accounted for the process met with considerable support and acceptance, but the researches of Messrs. Babcock and Russell, Wisconsin investigators, who have contributed much to the modern development of scientific agriculture completely set this aside; on the other hand, experimental observation went to show that in a simple physiological process, which depended on facts long recognised by botanists, lay the partial, if not the complete, explanation.

"The living plant cell is always carrying on the physiological process of respiration, a process quite similar to that in animals, and resulting in the use of oxygen, and the evolution of carbon dioxide. In this respiration carbohydrate bodies are used, with some albuminoids as well, and a certain amount of heat is evolved. Now the plant cells do not die when the plant is

cut down, but continue for some considerable time to carry on this process of respiration. Cutoing the plant to pieces appears, indeed, to increase temporarily rather than to decrease the respiratory changes. These may go on for several days until, indeed, the plant cells are fully dead."

From the account can be seen what takes place in the compressed heap; the cells of the plants are still living and breathing; oxygen they must have to carry on their functions; pressure has made a supply of this impossible, and hence to compensate for the external want, they oxidise a portion of their own substance; now, this oxidation, as all oxidation means an evolution of heat, and at the same time a giving off of carbon dioxide. So long as air is deprived and respiration continues heating proceeds, but once the

compression is relieved and air is admitted, as the practical farmer knows, the process stops, and after a time the material may be put together again with impunity. From this explanation then, it will be seen that the ultimate cause of heating is the fact that the grass or grain plants, as the case may be, are not sufficiently saved, and that the vital activities are too vigorous to admit of compression.

The saving of hay or grain or any green form of plant life is in reality a *drying* process; but it is also a *drying* process, and the latter precedes the former, inasmuch as the loss of moisture increased by the action of sunshine and air, robs the individual cells of moisture, and this hastens the suspension of their respiratory functions. Once the drying process has gone far enough to check any farther respiratory activity, the plants are sufficiently killed to be put together safely; henceforth there will be no danger of heating; grain once killed may be drawn to the stack wet with the morning dew, or, as we have often seen it, well damped by a passing shower, and yet no ill effects on its keeping in the stack followed. It is well to have this in mind; make sure that the plants have been sufficiently robbed of life by the drying effects of sun and rain; once this has been sufficiently proceeded with, the presence of a little dampness due to rain or dew need not be dreaded. To quote the recently expressed remarks of Professor McConnell:—"The whole matter is a question of greenness and moisture; if the moisture is natural sap then there will be heating, if the moisture is derived from rain then mouldiness will be the result." In Western Canada the latter process is the common one in case stacks or mows go wrong.

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WHAT FORM OF POTASH IS BEST?

Kainit is the cheapest form in which potash is offered for agricultural purposes, but it is not suitable for application to all soils nor for all plants, on account of the large proportion in it of chloride of sodium (common salt), of which it contains more than 40 per cent., or nearly twice as much as of sulphate of potash.

Its use can be recommended for light soils, which are apt to suffer from drought in dry summers, because the large quantity of salt in it has the effect of attracting moisture, and thus hindering the soil from drying off so quickly. On the other hand, in heavy soil, the salt may have an injurious effect, as it has a tendency to harden and cake the surface of the land, making it impervious to air, light, and gentle rains, and spoiling its physical condition. Therefore, in such case, the application of kainit should be avoided, and preference given to sulphate or muriate of potash.

The salt in kainit has the further drawback that it uses up the available lime, and therefore when applying kainit it is essential to see that there is plenty of lime present in the soil.

Kainit contains an appreciable percentage of magnesia, the fertilizing value of which is becoming more recognized.

Reverting now to the question as to what crops kainit, in consequence of its large proportion of salt, is suitable, or the reverse, it may be said that its action is decidedly favorable for roots, oats, clovers, and mossy pastures, but it is not so suitable for potatoes, and probably also not for hops. If it should be desired to use it for potatoes, the application should be made to the preceding crop. For tobacco cultivation it would not do at all. Both for potatoes and tobacco the proper form of potash is beyond doubt sulphate of potash.