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in their natural condition. These are everywhere known, now, to be strong and active fertilizers of all farm crops, especially when combined with the wood ashes or potash salts necessary to make them complete fertilizers.

But though driven from this stronghold by the power of facts, the asserters of the uselessness of "undissolved" phosphates have rallied behind a new breastwork, somewhat in the rear of their former position, and now declare with equal positiveness that though bones may be used to rdvautage, "sometimes", without being dissolved with acid, the mineral phosphates, no matter how finely powdered, are of "no more value than so much sand" when applied to crops as a fertilizer.

We have as strongly doubted this assertion as we doubted the other, and last summer we put the thing to a practical test, as detailed in the following paragraphs, recently contributed by us to the *New England Homestead*.

Last spring I determined to begin experimenting, to settle the matter for my own satisfaction and advantage. I have long been using ground bone and bone ash with perfect success and large profit as fertilizers in my orchard and gardens, and I never could see anything in the analysis of South Carolina rock to justify the belief that it is any less soluble or "available" as a fertilizer than those articles. And, furthermore, no chemist has shown that the phosphoric acid of our rich natural soils exists in any more soluble form than in the softer mineral phosphates. So I ordered a bag of "floats" [South Carolina phosphate rock ground to an impalpable powder] from the local agent of the Bowker Fertilizer Company, and selected for the trial a strip of land between two rows of trees in a young apple orchard. The central twenty feet in width of this strip was laid off into six rows, the five interspaces being each four feet wide. The land had received no stable manure for several years, but had been moderately dressed with bone fertilizers and planted with garden peas, beans and early potatoes for market. Enough of this fertilizing material remained in the soil to raise it above barrenness, but not to fix it for a crop. It was very uniform in its condition, as had been shown by previous crops.

I proposed to make the test on both corn and potatoes, three rows of each, and I divided the strip crosswise into three equal sections of one hundred feet each. The two end sections were dressed in the drills with Bowker's Hill and Drill Fertilizer, and the middle section with a mixture of floats, unleached hardwood ashes from my own fires and sulphate of ammonia, calculated to give precisely the same composition, as regards phosphoric acid, nitrogen and potash, as the Hill and Drill Fertilizer as analyzed at the Massachusetts Experiment Station. As most readers are aware, the last spring and carly summer were very dry-with me so dry that toward the end, at the time when the corn was beginning to show the point of the tassel within the circle of the inner leaf, and the potatoes were budding to bloom, the soil to the bottom of the furrow in my light ground would run out between the fingers from the closed hand. At the end of that dry spell, just before the rains came, the parts dressed with Hill and Drill were clearly ahead in growth, so that the middle section, where the floats were applied, viewed crosswise, was plainly lower than the two end sections. There was, however, no difference in color.

The last week in June the drouth was broken, and from that on there was rain enough. In ten days no difference could be seen in the two sections, and as the time of harvest approached repeated examinations showed that the corn (Early Dean Sweet) and potatoes (Snowflake) were ready for use at the same time; and finally the ripe crop was quite uniform the whole length of all the rows.

But our single experience is not obliged to stand alone in this matter. In one of the recent monthly reports of the South Carolina Department of Agriculture there is an important paper by Baron H. von Liebig, translated by Professor Guerard, on "Raw Ground South Carolina Phosphate or 'Floats." This able agricultural chemist declares that the greater efficacy of the dissolved phosphates consists only in their fineness when they enter the soil. He adds that it stands to reason that the higher the degree of fineness of the raw phosphate is, the nearer it is brought to the dissolved i manurial effect. But experiment has shown that raw ground phosphate of far coarser mechanical condition than that produced from the South Carolina phosphate was only ten per cent behind precipitated phosphale, when used in quantities of not less than one hundred pounds of phosphoric acid to the acre. Baron Liebig then shows that fine grinding adds materially to the manurial value of raw phosphate, making it indeed nearly equal in efficacy to dissolved phosphate, because it is thereby enabled to yield a larger per cent of its phosphoric acid South Carolina phosphate, passed through a sieve of forty meshes to the inch, yielded 23.6 per cent of phosphoric acid. Passed through a sixty-five mesh sieve it



MURRAY'S TWO-ROW PATENT POTATO PLANTER.

gave 3.68 per cent, while a one hundred thirty mesh sieve enabled it to yield 76.4 per cent. All of the fine ground South Carolina "floats" tested by him passed entirely through the one hundred thirty mesh sieve.

The inefficacy of "insoluble" phosphates, Baron Liebig goes on to say, especially in poor soils, is caused often by a want of potash in the land. This constituent should therefore be supplied to the soil along with the phosphoric acid, and that is exactly what we did, making a complete fertilizer by also adding the proper proportion of nitrogen in the form of sulphate of ammonia. We sincerely hope that experiments will be made all over the country, by experiment stations, agricultural colleges and intelligent individual farmers, to the end that we may all get our phosphatic plant food in the cheapest available form. "Floats" cost, delivered in Vermont, from \$15 to \$19 per ton, and they contain just about twice as much phosphorio acid as the average commercial superphosphates. In a future issue we will give detailed directions how to prepare and apply these "floats" to the erops successfully. They are called "floats," by the way, because the rock is so finely pulverized that it floats in the air, and after settling on the floor of the stamping-room is put up for sale. It is fully as fine as flour. (1)

DR HOSKINS.

(1) All right. But I should mix some good plain superphosphate with the floats to start the crop. A. R. J. F.