

proven its efficiency in increasing the fertility of his land, and, it is hoped, its use will be increased.

There is doubtless enough in this single deposit to enrich some thousands of acres of the adjacent lands, and there are many similar deposits in Washington and Frederick counties which ought to be given to the soil.

4.—GUANO.

The full account of guano in the first report leaves little to be said in reference thereto at this time.

The system of drilling in small quantities with wheat has continued to grow into favor, and it is doubtless more judicious and economical than the method formerly practiced of sowing 300 to 400 lbs. to the acre, and plowing it deeply into the ground.

Baron Liebig, in a letter to Prof. S. W. Johnson, of Yale College, observes that a given weight of guano has greater fertilizing effect than an artificial mixture containing the same proportions of phosphate of lime and ammonia. Some investigations were made by him in this connection. He found that if Peruvian guano be diffused in water, and then thrown on a filter and washed out, a dark brown solution is obtained containing 8 or 10 per cent. of oxalate of ammonia. The liquor which passes through the filter also contains a very small proportion of phosphate of ammonia and potash, containing $\frac{2}{3}$ of one per cent. of phosphoric acid.

A different result is attained, however, when the guano is allowed to remain diffused in water for several days. In this last case, after being washed out with water, the proportion of phosphoric acid is doubled with a corresponding diminution of oxalic acid. The longer the action of moisture continues, the more of the phosphates pass into the readily soluble phosphate of ammonia.

When heavy rains immediately follow the sowing of guano, the soluble oxalate of ammonia is taken off, and presents the action above alluded to. Gentle showers, which *soak* without *leaching* the guano, promote its action by furnishing the conditions for transmitting its phosphates into super or more soluble phosphates.

The results of Liebig's experiments induce him to recommend that Peruvian or other ammoniated guanoes be moistened with water containing sufficient sulphuric acid to give it a decided sour taste. This should be done a few days before sowing the guano.