these ways will produce better results than ground bones, and the cost is less than pure ground bones, which cannot be obtained in so fine a state of division as the mineral phosphates. If the nitrate of soda or sulphate of ammonia are dissolved in water, and in this form applied to the ground phosphate, the mixture is more intimately made, and the changes of combination take place quicker than in a mechanical mixture. It takes but a short time to get the phosphate dry again, and any lumps formed will break down with the back of the shovel. When the farmers understand these points, they will use these articles in preference to purchasing ground bones, and bones will be sold lower in consequence. Our experiment stations do not do their full duty, but they may wake up some day and give the farmers some information, the most important I believe to be on manures."

In regard to the preference between sulphate ammonia and nitrate of soda as a source of nitrogenous plant food, nitrate of soda, as Mr. Ward says, acts more promptly, and does more good upon an already established crop, than sulphate of ammonia, because the ammonia of the latter has to be changed into nitric acid in the soil before it becomes available, while the latter already exists in the nitrate of soda. Therefore, as an application to mowing, or in spring to winter grain, nitrate of soda will do best. But for application *with the seed*, as in spring-planted crops, where there are no ready-formed roots to take the immediately dissolved nitrate, there is apt to be a considerable waste by leaching before the plants are ready for it, which is not so likely to take place with the sulphate of ammonia. For that reason we prefer the latter for most of our crops.

But the "new idea" to which our heading refers, is that there is a sufficient chemical reaction between the alkaline fertilizers, such as ashes and the potash salts, to make the phosphoric acid in ground phosphate rock to a considerable extent immediately soluble. This statement, if, as we have no reason to doubt, it is sustained by chemical tests, is of very great importance to farmers who are seeking for the best fertilizers in the cheapest form. Mr. Ward says on this subject in the Boston *Weekly Globe*:

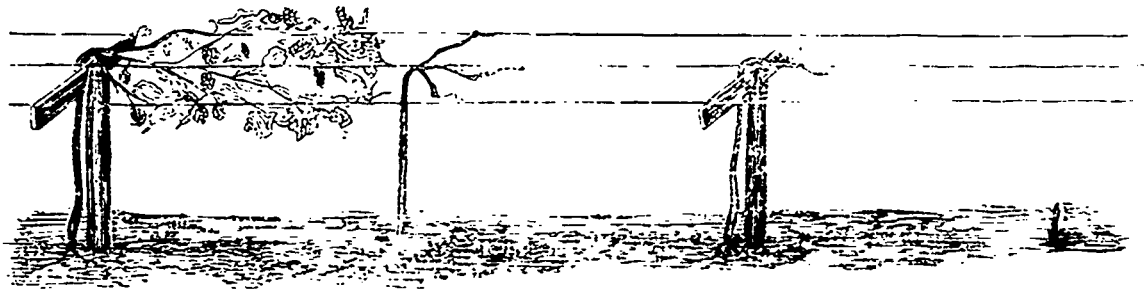
"It is not generally known by farmers that bone phosphate can be decomposed by alkalies as well as by acids. Next to phosphoric acid alkalies are the most necessary to use on our soils, and it would seem the part of wisdom to use alkalies for decomposing phosphates, instead of acids particularly, as it reduces the cost. Plants can take a neutral salt like phosphate of potash without injury, but when an acid salt is used the soluble phosphoric acid formed reverts before it can be utilized by the plant, or it is an injury instead of benefit to the plants; but in the form of phosphate of potash it is immediately available to the plant, which can absorb it with good results. An important question is the process adopted to secure these results, and the relative cost of acid and alkaline phosphates. These will not vary much from the following.

1,000 pounds mineral phosphate, 28 per cent $12 per ton	$6 00
800 pounds sulphuric acid, one cent per pound	8 00
200 pounds water	0 00
2,000 pounds, or one ton, costing	$14 00

containing eleven per cent, or two hundred and twenty pounds soluble phosphoric acid of the *estimated value*. For the purpose of comparison by the experiment stations, at twelve and one-half cents a pound, or $27.50 the ton, for what costs but $14.

1,000 pounds mineral phosphate, 28 per cent, $12 per ton	$6 00
500 pounds salt, one-fourth per cent	1 25
500 pounds lime, one fourth per cent	1 25
2,000 pounds, or one ton, costing	$8 50

containing eleven per cent, or two hundred and twenty pounds soluble phosphoric acid, at twelve and one-half cents, the estimated value of the experiment stations, $27.50 per ton,



Fourth Year. Third Year. Second Year. First Year.

CAYWOOD'S GRAPE TRELLIS.

for what costs $8 50 per ton. The above mixture produces a phosphate of soda equally as good for corn as the following mixture for phosphate of potash:

1,000 pounds mineral phosphate, 28 per cent, $12 per ton	$6 00
500 pounds muriate potash	8 75
500 pounds lime	1 25
2,000 pounds, or one ton, costing	$16 00

containing eleven per cent, or two hundred and twenty pounds soluble phosphoric acid, twelve and one-half cents, or $27 50, and twelve and one-half per cent, or two hundred and fifty pounds actual potash at four and one-half cents, or $11 25, making in all $38 75, at the *estimated value*, by the experiment stations, of what costs $16.00. From the above it is seen that a soluble phosphate can be made from an alkali in the form of phosphate of soda forty per cent cheaper than an acid phosphate, reckoning the price of sulphuric acid used in making the acid phosphate at only one cent per pound, about one-half the price it can be purchased at. Alkaline phosphates are in better form than acid phosphates for food for plants. The plants need alkalies as well as phosphoric acid. The alkalies not only furnish food for plants, but neutralize the acids of the soil, liberating the plant food, putting the soil in its most favorable condition, with proper cultivation, to produce profitable crops. Another advantage