

hardest of dry clay and only nine inches wide at the surface, where two and a half feet in depth was required. This method moves the minimum of earth and gives plenty of room for laying the tile.

The same method applies to filling the ditch. Most beginners make the mistake of making too wide a ditch. This entails double labor both in digging and filling.

Commercial Fertilizers--A Reply to Criticisms

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Permit me to reply to criticisms in the December issue of The Canadian Horticulturist, on my communication relative to commercial fertilizers, which appeared in The Canadian Horticulturist for November. Mr. Emslie, of the German Potash Syndicate, opposes my argument and I take exception to his statements. He states that I cling to "old and discredited theories." My assertions on fertilizers are the result of thirteen years of research work on "soils and plants," after eight years of university training for the work. My conclusions have matured within the last six years and are based upon experimental research, chiefly in the Michigan Agricultural College. The views are discredited, I think, only by those unacquainted with the details.

Mr. Emslie defines plant food thus: "We only know that plants draw on the soil for certain substances entering into their composition." From this we must include copper as a food, because it is found in many plants, notably wheat. But copper is a poison except in the most minute quantities. The plant would be better without it. The copper

is taken in by a physical action purely. The definition fails because it includes what is clearly not a food.

Take Mr. Fox's definition: "Plant food is any substance that is worked into the soil that will cause it to produce a better crop." Now, oxygen will, under these conditions, produce a better crop, and yet it does not enter the plant at all. So will several other substances acting as catalysers. These could hardly be called foods since they do not enter the plant. A whip might make a horse do more work, but surely a whip is not an animal food. A curry-comb may cause a steer to put on more beef, but a curry-comb is not a stock food. Yet this is the logical conclusion from that definition.

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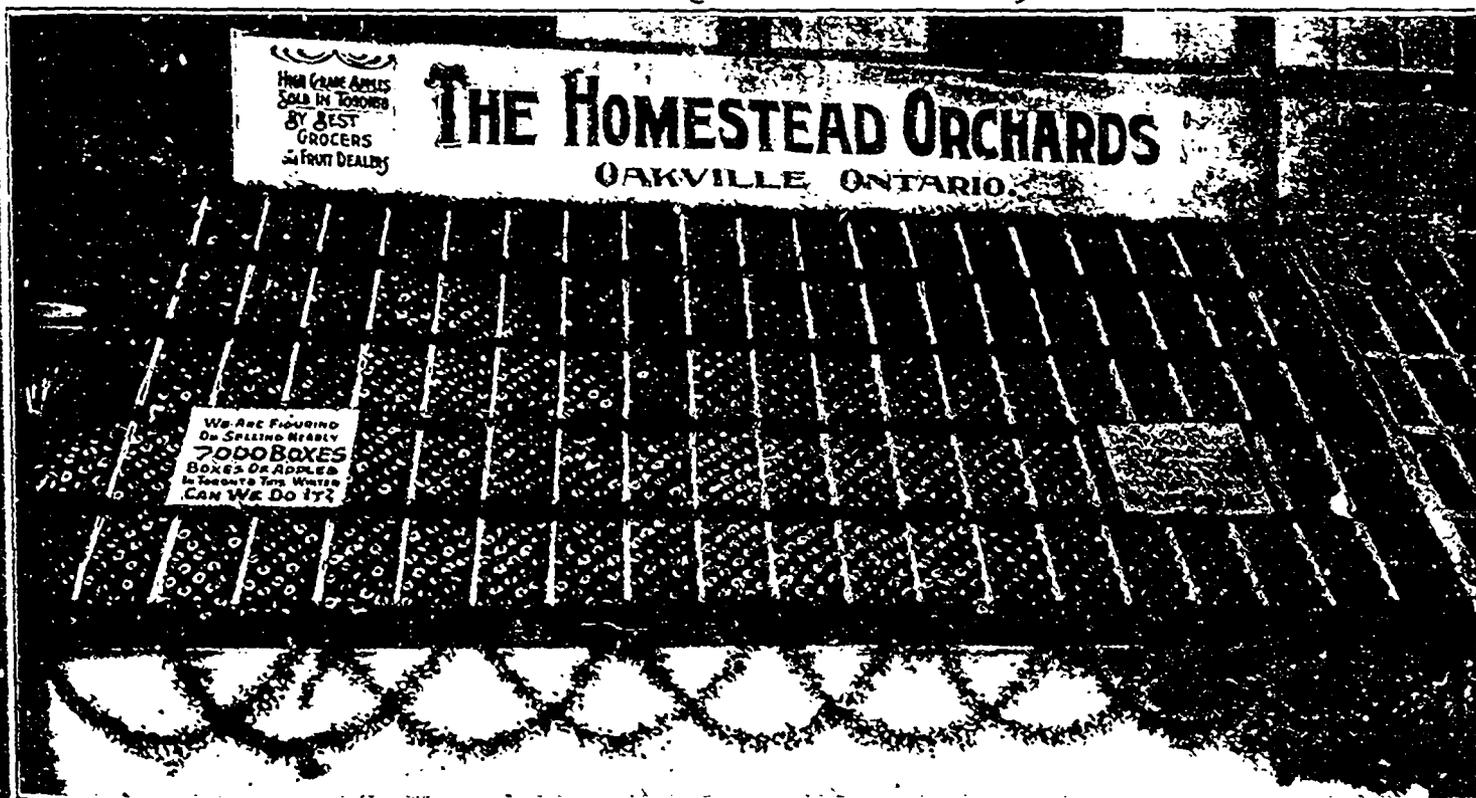
Dr. Emslie says: "Dr. Dandeno might state with equal aptitude that the food which we eat does not nourish our bodies." Not at all, these cases are not parallel. We are nourished entirely differently from any Chlorophyll-bearing plant. There is no comparison, because the plant organizes its own "food" and the animal consumes what has been or-

ganized. Unless we assume a fungus plant, there is no comparison, and even then I disclaim connection with "we."

That more than half the money spent in artificial fertilizers is wasted is very plain to those familiar with the problem. Here is a fact supporting this estimate. In the Geneva, N. Y., Experiment Station an experiment now going on eleven years continuously with an apple orchard, shows these results, quoting from Bul. 339, p. 188, 1911:—"The final conclusion must be that the trees in this experiment would be practically as well off in every respect had not an ounce of fertilizer been used." Four types of fertilizers were tested, and this experiment is the most reliable in America.

Mr. Emslie says further: "The majority of fertilizers are of mineral origin." At a glance one can see that that is not a fair statement. Here are the fertilizers in common use: Bone meal, dried blood, guano, fish products, slaughter house products, cotton seed, night soil, sewer sludge—all organic. Even wood ashes and nitrate of soda are of organic origin. The chief mineral fertilizers are phosphates and potassium compounds. But an average soil will contain enough phosphates to last for two hundred and fifty years, and enough potassium to last for a thousand years. These are not necessarily all available at once.

As to Mr. Fox's challenge, I grant him at once. The manure would likely produce an increased crop and the pock-



A Sample of the Very Fine Exhibits of Apples put up by Private Concerns at the recent Ontario Horticultural Exhibition in Toronto