

WHY ORGANIC MANURES ARE BETTER THAN CHEMICAL FERTILIZERS.

By J. I. RODALE, *Emmaus, Pennsylvania.*

(Communicated by Prof. N. R. Dhar, F.N.I.).

The purpose of this statement is to present data to show that there is a need for a scientific re-evaluation of the use of Chemical fertilizers and poisonous insecticides in our agriculture. In my opinion sufficient scientific data already exists to show that the extended organic method is far superior to the present general practice with respect to fertilizer usage, from not only the human health standpoint but from the point of view of preventing soil erosion and giving higher yields at a lower cost.

HISTORY OF THE ORGANIC METHOD.

There is a tendency to say that the organic method is as old as history and was practised by the oldest civilizations. This is not true as evidenced by the downfall of those civilizations. It is possible that with the practice of the extended organic method on a widespread scale in any civilization, that civilization will be able to persevere indefinitely and not go the way of Babylonia and Rome. These old civilizations countenanced the burning of manure as a fuel and stood idly by while the most rudimentary principles of basic agriculture were violated. The world has never seen, except in a few isolated cases, the practice of a thorough organic method, and with such a practice there is hope of building a civilization such as has never before been seen, for not only does physical health come from our food through the fertility of the soil in which it grows, but also our minds and characters are nourished and nurtured through that very soil. The people can only be a reflection of the soil which they culture. Poor soil—poor people. Mediocre soil—mediocre mentality of the people. Science can quickly prove this.

The founder of the organic farming movement is Sir Albert Howard who in 1940 wrote *An Agricultural Testament*, which was published by the Oxford University Press and has since gone into many printings. This book states in no uncertain terms that the use of chemical fertilizers are dangerous to the health of people, animals and the soil. It describes how oxen in India that were fed on organically produced food could rub noses with oxen that were eating ordinary food and that had hoof-and-mouth disease and did not contract the disease even though they were not inoculated against it. Sir Albert was a British Government agricultural scientist of the highest standing. He was knighted for his contributions to agriculture. This book is a *must* in an investigation of this kind and represents the experience of more than thirty years with the organic method.

THE EXTENDED ORGANIC METHOD.

The organic method is still in a process of improvement and evolution. Originally, ten years ago, it consisted merely of the making of compost from organic matter such as manure, leaves, weeds, etc. Then a source of phosphate was added in the form of phosphate rock ground up fine. Recently we have added the use of potash rocks of various kinds, usually granites. Potash is also used in the form of greensand. These give their nutrients to the soil without the acids or the high solubilities of the chemical forms of these elements. In the organic method we

also use lime and slag from steel furnace processes. There is already available manufactured fertilizers which contain organic matter and ground rocks mixed to give controlled combinations. A thriving new industry is gradually being built up to serve the organic farmer and gardener, which has shown an interesting growth in the last two years. The chemical fertilizer industry should not disdain this market, for it may eventually be like the story of the tortoise and the hare or the railroad and the stage-coach. Once a person has started with the organic method it is rare to find him change back to chemicals.

Originally, when the organic farmer was dependent only on the making of compost, it was quite difficult to practice the organic method, but now with the various rock fertilizers the need for organic matter is lessened and the method is becoming quite practical. Another thing to bear in mind in regard to the practicality of the method is that originally all the organic matter had to be composted first before being applied to the land. We now apply the raw organic matter direct to the land in places where crops will be planted later. This is not only labour-saving but conserves more of the nutrients of the organic matter. This is in accordance with the researches of Dr. N. R. Dhar, Head of the Chemistry Dept. of Allahabad University.

THE HEALTH ASPECT.

I should like to present a piece of research that was done by Dr. Ehrenfreid E. Pfeiffer at his laboratory at Threefold Farms, Spring Valley, New York, in 1948-49, which was financed by The Soil and Health Foundation of which I am the President. Dr. Pfeiffer was granted the honorary M.D. degree by Hahnemann College of Philadelphia for his work in diagnosing disease by means of crystallization of the blood. In this experiment two groups of mice were fed—the one on food raised with chemical fertilizers and the other with organic fertilizers, which proved that the group of mice that was fed with organically produced food was much healthier than that which was fed with food raised with chemical fertilizers. The results were recorded in Bulletin 2, dated November, 1949, of the Soil and Health Foundation. It showed, for example, that in a strain of mice that was chosen for its susceptibility to cancer, the survival rate was 64% in the case of the organically fed mice and only 35% in the case of the mice fed with chemically fertilized food. In connection with deaths from fighting—the organically fed group suffered 15% of deaths while the chemically fed mice killed each other off at the rate of 21%. In examining the mice themselves an interesting thing could be observed.

After the first stage of this experiment was completed, the mice were subjected to a carcinogenic or cancer-causing chemical, painted on the skins of both groups. In the chemically fed group 71% of them became cancerous. In the organically fed group, only 45% came down with the disease.

That chemical fertilizers could be detrimental to human health was shown by a professor of Cornell University, a noted soil scientist, the late Dr. J. K. Wilson. In an article in the January, 1949, issue of *The Agronomy Journal*, entitled 'Nitrate in Foods and its Relation to Health', Dr. Wilson said: 'Leafy vegetables, frozen foods, and prepared baby foods were analysed for their content of nitrate. From the findings it is suggested that the nitrate in such foods may contribute to hemoglobinemia found in infants and may produce certain toxic, if not lethal conditions in adults. The high content of nitrate in the foods may be attributed in many instances to the application of nitrogenous fertilizers, especially nitrate of soda, to the growing of crops.'

An experiment was carried out by M. J. Rowlands and Barbara Wilkinson, two university research workers, who reported their findings in the *Biochemical Journal*, Volume 24, No. 1, 1930. In it they said: 'It was decided to try the effect of artificial manure (chemical fertilizers) *versus* dung. A crop of clover and grass was grown, one-half fertilized with dung, the other half with chemical fertilizers

including basic slag, kainit and sulphate of ammonia. Then rats were tested by feeding them the product of these fields. . . . The rats were divided into two lots; one lot was put on a deficiency diet to which was added 20% of the "dung" seed, the other on a deficiency diet with 20% of the "artificial" seed. . . . The rats on the "dung" seed showed good growth or a slightly subnormal growth. . . . The rats on the "artificial" seeds all grew very poorly, not one giving normal growth. . . . It can be seen that the former have gained nearly twice as much as the latter. . . . The rats on the "artificial" seed were in poor condition; in some the hair was falling out.'

Sir Robert McCarrison, the great English research physician, in 1926, in experiments with grains at Madras, India, discovered the same thing. He found that grain, if grown organically, contained more vitamins. For more details see the *Journal of Indian Medical Research*, Vol. 14: 351, 1926.

In Chapter 12 of *Bio-Dynamic Farming and Gardening* (Anthroposophic Press) the author, Dr. Ehrenfried Pfeiffer, describes an experiment with chickens. The organically fed chickens were stronger, laid more eggs and produced a more hatchable egg. In the chemically fed group only 35% of the eggs hatched. In the group where the chickens were fed on feeds grown organically, hatchability was 68%.

In the same book Dr. Pfeiffer gives in great detail, pages 185 to 190, a description of experiments carried out with turkeys in feeding with chemically fertilized feed as against feed produced with stable manure. The article summarizing his results, was entitled 'The Biological Value of the Products of Soil Fertilized with Animal or with Chemical Fertilizer', and was published in the *Proceedings of the R. Accademia Nazionale dei Lincei*, Mathematical, natural scientific division, Vol. XIII, series 6, I, Rome, February, 1931. The results were spectacular. The turkeys fed with food grown with stable manure showed a smaller number of cases of sickness, a shorter duration of it and a far smaller number of deaths. He summarizes: 'This means that the seeds, and still more the leaves of plants fertilized with stable manure have the peculiarity, when used as food for these animals, of increasing their capacity for resisting disease to a greater degree than the corresponding seeds and leaves of mineral-fertilized plants. The former have thus a higher biological value than the latter.' The stable manure also produced higher yields in the plants.

In Dr. Pfeiffer's book mentioned above, pages 190-191, the author mentions three German physicians, Schulz, Reinhardt and Kalkhof, who wrote articles in German medical magazines giving their experiences in effecting cures of patients with the use of organically produced bread and other products. They cured a series of metabolic disturbances. They found it to be especially effective with weak and backward children, and to have a definite influence on the functioning of the stomach and intestines. They have thus cured, without medications, cases with marked stomach troubles and sluggish intestinal activity.

There is a host of scientific information available in the literature to prove that the use of organic matter in the soil makes for healthy plants. I will quote a statement by Dr. Selman A. Waksman, the discoverer of streptomycin, from his book, *Humus* (p. 409): 'Plant deficiency diseases are usually less severe in soils well supplied with organic matter not only because of the increased vigor of the plants but also because of antagonistic effects of the various soil micro-organisms which become more active in the presence of an abundance of organic matter'. At the Connecticut Agricultural Experiment Station, this was confirmed in experiments with fusarium rot of squash seeds (Bulletin 500, Nov., 1946, Physiology of Fusarium Foot Rot of Squash).

If space permitted I could give data from ten or more physicians who have written upon the effects of chemical fertilizers and human health. I will mention one—James Asa Shields, M.D., Professor of Neuropsychiatry of the Medical College

of Virginia, who at a meeting of over 1,000 physicians at Miami, Florida, on Nov. 4, 1946, said, 'Thus we see that multiple sclerosis, depletion of soil, and the introduction of inorganic chemicals as a treatment for the soil were all introduced to man between the years 1836 and 1840'.

In spite of all this evidence much of which has been available for many years, many agricultural scientists who are at the head of Departments in large American Agricultural institutions have pronounced in speeches and in articles that there is no evidence that the organic method of producing food gives people better health.

WHY THE ORGANIC METHOD IS DESIRABLE.

In my book *Pay Dirt*, Chapter 9, I have listed 36 reasons why organic farming is superior to farming with chemical fertilizers and I am submitting that chapter as Exhibit L. Here, however, I am only going to list the 36 of them, as follows:

- (1) The general fertility level of the farm or garden is greatly improved by the organic method.
- (2) This method improves the soil's mechanical structure which includes its granulation, tilth and increase of pore spaces.
- (3) It makes of ease of cultivation.
- (4) It eliminates valuable waiting time. The farmer can get back on the soil quicker after a rain.
- (5) It increases the soil's water-holding capacity.
- (6) It prevents soil erosion and reduces flood hazards.
- (7) It prevents hardening of the surface soil by driving rains.
- (8) The earthworm multiplies greatly, because organic matter is its natural food.
- (9) It multiplies the microbial population of the soil.
- (10) Land can safely be plowed more deeply.
- (11) Hard-pans will not form.
- (12) There is no danger of a plow-sole.
- (13) Heavy machinery does not compact the soil as much.
- (14) The soil has much better aeration.
- (15) Soil made darker by humus absorbs heat more quickly and more effectively.
- (16) Dry weather advantages. Under drought conditions an organic soil will fare better due to its stored up water.
- (17) It may actually improve rain conditions.
- (18) It transpires less water through the leaves.
- (19) The manure produced from cattle fed on an organically operated soil improves in quality from year to year.
- (20) Making compost where small farmers decide to do it, increases the available manure by 300 per cent.
- (21) Compost heaps preserve all the food elements in the manure.
- (22) Compost have a residual effect.)
- (23) When following the organic system your grounds look neater.
- (24) Weeds can be cultivated more easily out of an organic soil.
- (25) Compost is a 'safer' material than just ordinary stable manure.
- (26) Compost kills out weed seeds.
- (27) There is less risk of crop failure.
- (28) There is very little plant disease.
- (29) The insect menace is reduced to a minimum.
- (30) Few, if any, poison sprays are needed.
- (31) No chemical treatments are needed for seeds.
- (32) It builds health.
- (33) Farm animals fed on organic produced feeds are healthier.

- (34) Foods raised organically taste better.
- (35) The general quality of the crop is much higher.
- (36) Humus seems to counteract the effects of poisons in the soil.

WHY CHEMICALS ARE HARMFUL?

Usually a typical chemical fertilizer contains a nutrient that the plant can use, but it also carries elements that the plant cannot take up in appreciable amounts. The result is that these other substances remain in the soil and cause trouble. A case in example is nitrate of soda. The plant uses much of the nitrate but not much of the soda which remains in the soil and is known to be a hardening agent. This sodium actually combines with carbon to become carbonate of soda which is washing soda. Some soils become almost as hard as concrete because of this. Then when it rains the water cannot penetrate and washes off the soil, taking some of the top-soil as erosion along with it. Another bad feature about the soda in nitrate of soda is that in many cases the plant takes up more soda than is good for it, and it has the effect of driving out other important nutrients. Similarly, other chemical fertilizers carry substances which remain as dangerous residues in the soil.

ROCKS AS FERTILIZER.

If any one thing can come out of this investigation it should be the development of a new consciousness in agriculture in regard to our attitude toward ground up rocks as a fertilizer, because India has billions of dollars worth of this resource which is now going begging. In a paper entitled *Native Rocks as a Fertilizer* written by Dr. W. D. Keller, Professor of Geology of the University of Missouri, which appeared in the April, 1950, issue of the *Organic Farmer* we have an amazing document, for here is a scientist, who is closely associated with Professor William Albrecht of the same university, and who unequivocally attacks the use of chemical fertilizers. He wrote an article, 'Native Rocks and Minerals as Fertilizers', in *Scientific Monthly*, February, 1948, in which he says: 'The serious defect of a highly soluble, concentrated fertilizer is the powerful mass-action effect that it exerts to overstock with a few elements the humus and clay colloids from which the plants accept their nutrients, thereby suppressing, or blotting out entirely (for practical purposes), the availability of other elements also sorely needed by plants for optimum growth. The rich solutions from the soluble fertilizer convert the "nutrient jobber" colloids into a relatively homogeneous, undiversified system, which forces on to the plants an excess of a few elements to the exclusion of others. By its overconcentration in some constituents such a fertilizer creates nutrient deficiencies in others—despite its purpose to correct deficiencies.'

In an article I wrote in the Feb., 1949, issue of *Organic Gardening* entitled Phosphate Rock, I give much data to show the practicability of using ground up phosphate rock instead of superphosphate. It shows that in the State of Illinois very little of the superphosphate is used by farmers. For example in 1947 that State used about 48,000 tons of superphosphate against 707,000 tons of the ground up phosphate rock. The answer of some agriculturists is that the soil is different in each state and that phosphate rock cannot be used where the soil is too alkaline. But it is a known fact that where there is sufficient organic matter the phosphate in the rock becomes available through the organic acids of the decaying organic matter even under alkaline conditions. Phosphate rock alone is therefore not sufficient in good organiculture practice, and that is the advantage of the organic method which places such an important stress on the obtaining of outside organic matter, that is, residues of organic matter which are to be found outside of a farmer's own place, matter which today is dumped or burned. It exerts beneficial effects on minerals in the soil.

Along with phosphate rock there is available billions of tons of various kinds of rocks which contain potash. A bulletin issued recently by the Connecticut Agricultural Experiment Station entitled *The Potash in Granite is Available* describes a three year experiment in the growing of tobacco using granite rock as the potash source against the chemical form which proved that the potash in the rock *was* available for the needs of the growing crop. The tobacco grown with the rock had a better smoking aroma and the ash was superior, while the yields were not any lower than the chemically fertilized tobacco. Had organic matter been used as is done in the organic method the yields no doubt would have been much higher.

The agricultural scientists must turn about in their attitude toward the rock fertilizers which have been absolutely ignored by them. Experiments must be begun on an extensive scale. They must not close their minds academically to it simply because their text-books state that the nutrients in rocks are not available. The text-books will have to be altered. We are living in an era of change. For India billions of dollars can be saved if that country uses ground rocks instead of chemical fertilizers.

Trace Elements.

One of the most astounding things about the controversy between the organiculturists and the chemicalists is the fact that the latter in their writings and in their experimentings have shown and proved conclusively that by means of the organic matter in the soil the trace mineral elements become available to growing plants. I do not have to use up any time to describe the tremendous importance of making these trace minerals available. Much of the disease in plants is due to their lack. It is through the organic matter in the soil that the trace elements are usable by the plant. Truog and Berger of the University of Wisconsin, have recently stated that after testing thirty-four virgin and forty-eight cultivated soils, the organic matter in the soil made boron available to plants. Soils with a high lime content and soils depleted of organic matter, they said, were found to be low in boron that the plants could use. It is not enough to have boron in the soil. It must be available. Also, an excess of potassium makes the severity of boron deficiency more pronounced. The last statement is important because it shows how in the use of potash that is obtained from the too highly soluble chemical fertilizers an oversupply can easily be achieved, which then acts as a depressant on the boron in the soil.

HOW DOES THE ORGANIC METHOD COMPARE TO THE CHEMICAL METHOD AS FAR AS YIELDS ARE CONCERNED?

In an editorial I wrote in *Organic Gardening* of December, 1950, entitled 'Do Chemical Fertilisers Give Higher Yields?' I gave data to show that the greatest yields come where there is sufficient organic matter in the soil, and here again damaging evidence is given—pronouncements made by our very critics—that organic matter is at the bottom of high yields. A statement is included by Wheeler McMillen, Editor of the *Farm Journal*, who shows that there has not been an increase in farm yields in the last fifty years. This in spite of the heavily increasing use of chemical fertilizers. That chemical fertilizers give higher yields is a vicious fallacy. On my own farm, where no chemical fertilizers are used, we average about forty per cent more crops per acre than the average for our section. There is much other evidence along the same line coming from other organiculturists. It would seem, that by propaganda, the farmer has been held in the subjection of the belief that chemical fertilizers will give him more bread and butter. The system which feeds that propaganda to him should be thoroughly investigated. In such a study it will be found that the chemical fertilizer manufacturers subsidize research in the agricultural experiment stations in such vast

sums that the researches that issue from that money cannot possibly be unbiased. The Government, by shirking its responsibility, by not furnishing sufficient money to keep all the agricultural scientists employed, permits some of them to practically become the employees of prejudiced interests. And the public is ground between these two mill-stones, for it gets the food that is produced under these unsatisfactory conditions.

POISON SPRAYS.

There is much evidence that when plants are healthy they will resist disease just as human beings will who are healthy. There is a considerable amount of scientific evidence in our agricultural journals that proves this.

It is an accepted fact in conservative agricultural circles that an oversupply of nitrogen causes a water-logging of plant tissues which cause certain fungus diseases to develop. It is so easy to create a condition of oversupply of nitrogen when chemical fertilizers are used. In the organic method, however, there is a gradual release of nitrogen from the organic matter at a pace that the plant can handle without trouble. I have shown previously how an oversupply of potash can reduce the available boron, and thus cause disease. Certain poison sprays are used to kill off the fungi that might be present in such diseased conditions. In my own practice of the organic method, and in the experience of many others, it has been found that we can keep disease down quite well. It is when the insect comes into the picture that it is not so easy.

However, in previous times orcharding was done without spraying and wonderful fruit was obtained. The Bible speaks of the land running with milk and honey. Old-time farmers have told me that they remember the time when no sprays were used and their fruit was tolerably good. Today the condition is becoming more and more acute with each year of spray poisoning. It seems to be bringing more and more insects. Is it possible that the increasing artificiality of the conditions of the trees is causing nature to produce more insects who wish to destroy these things which she considers an abomination? There is a great deal of evidence that the insect is a censor of nature appointed by it to destroy unwanted vegetation. The insect will come when there is a deficiency of some kind in the soil, or if a plant is growing out of its right medium, or where conditions of temperature are not optimum. There is a rhyme and a reason to the presence of insects and to the amount of them which are present. They are not merely an accident of mere occurrence. Nature has evidently trained them through the processes of evolution as a regulator of plant life. I can explain this by a medical experiment which I know of where fleas ceased to plague dogs who were fed vitamin C. The healthy skin they obtained by such feeding was distasteful to the fleas. And this is the point which I want to make in reference to insects. They have a taste different from a human being. Evidently they seem to relish sick plant tissue, or plants that have a sub-clinical amount of disease—that cannot be seen with the eye perhaps caused by feeding on chemical fertilizers.

I can give an illustration of what I mean by the insect as a censor of nature. I planted beans in two different pots—one a place where top-soil has been washing down on and enriching for years. The other at the place from which the top-soil has been washing. The Mexican Bean Beetle came only to the beans that grew on the poorer soil. Another illustration. I grew lettuces in a hot-house and aphides came and attacked them. Two months later I grew lettuces of the same variety on the same spot without fumigating and no aphids came. Why? Because the first plants grew in December when the days were short and there was no sunshine. The plants were stunted and the aphids seemed to like the taste of them. In February the days were longer and there was much more sunshine. The plants were healthier, and the aphids did not want them. I could cite a dozen other similar experiences.

Dr. Leonard Haseman, a distinguished entomologist of the University of Missouri, has done a great deal of work in this field and has shown many times in his experiments that insects come when there are deficiencies, especially of nitrogen. Dr. C. Stafford Brandt of the Federal Nutritional Laboratories at Cornell University performed an experiment in growing potatoes in which I furnished the compost. One section was grown with chemicals, the other with compost. At the end of the season Dr. Brandt introduced an equal number of aphids in each plot but he soon found that the majority of them landed up in the chemical plot. Evidently they liked something about the taste of the plant tissue grown with chemical fertilizers.

Incidentally our Soil and Health Foundation is negotiating with Dr. Haseman of the University of Missouri to give them a grant to study further into this question. A few months ago this foundation gave a grant to the University of Missouri for research to study potash rock fertilizers as against its equivalent in the form of chemical fertilizers.

Spraying poisons is an extremely unscientific procedure. It not only leaves dangerous residues on the crops which no amount of washing can completely get off, but it kills bacteria in the soil on which it falls. It is a sledge-hammer method. One entomologist once wrote me that it is a stop-gap device until something better is discovered, but it is about time that something better be substituted for the stop-gap which is becoming too expensive for the grower. It is leading him gradually into an economic impasse because of the gradually increasing number of sprays that the mounting insect menace seems to demand.

There are safer methods that should be experimented with. For example, the Nisbet Bug Catcher made in Texas which blows the insect into a bag attached to a blower on the tractor. There are methods of breeding enemy-type bugs which are let loose in the orchard and which attack the damaging insects. Much work is being done in California in this field. There are traps in which the female insect is placed which lures the male into it. There is a growing field of theory of planting certain plants nearby which either attract the insect or exerts a biologic effect over it which repulses the insect. The field has hardly been scratched. The entomologists have started with poison spraying and have found it so convenient that they close their eyes to any other methods. And they are becoming more daring. They are now working along new lines. Instead of spraying the tree or plant they expect to spray the poison on to the soil to be absorbed by the plant so that when the insect takes a bite of a leaf it will curl up its toes. But what about the people that will eat such a plant? Even to think about such a method is a downright crime against the people.

In conclusion, I wish to quote from two books showing that many experts believe in the possibilities of the organic method. First from the book called *The Business of Farming* published by the Oklahoma University Press, and written by Ladd Haysted, Agriculture Editor of *Fortune Magazine*. In it he says: 'The organic theory has not been adapted to commercial agriculture on a wide scale, although very recently a book entitled *Pay Dirt*, by J. I. Rodale, has attracted much attention and may bring in its wake wide experimentation and possibly an eventual significant acceptance'. Ladd Haysted mingles with the best there is in agriculture. He is a deep student and a practical man of agriculture. What he says should carry some weight.

William J. Hale, research consultant for Dow Chemical Company, a company that furnishes much chemical materials to agriculture, a man who is a distinguished chemist, recently wrote a book called *Farmer Victorious*, published by Coward McCann, and said in it: 'Chemical fertilizers gradually contribute to a degeneration among our plants, with the result that in due time our plant geneticists are constrained to import sturdier and hardier varieties of plants from more or less primitive lands in order, by cross breeding, to reinvigorate the seeds of our own plants.' In this book he recommends my book *The Healthy Hunzas*, which is an

attack on chemical fertilizers. He condemns poison spraying although he is a research consultant for a company that makes chemicals for spray poisons.

In closing, I would like to quote a statement made by Professor Firman Bear, Head of the Soils Department at Rutgers at the recent annual meeting of fertilizer manufacturers and dealers held at Rutgers. He said: 'the fertilizer industry should interest itself in the activity now going on to get more elements back into the soil and stop looking at organic farming with a jaundiced eye'.

Organic farming is here to stay.

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