

# THE REPUBLICAN.

BY W. B. GULICK

NEWBERN, N. C. WEDNESDAY, NOVEMBER 15, 1848.

VOL. 2, NO. 45.

## PRIZE ESSAY ON THE RENOVATION OF WORN OUT LAND, By Edward Stabler, Of Sandy Spring, Montgomery Co., Md.

The Publisher of the AMERICAN FARMER having offered \$100 for the three best Essays on the above subject, viz: \$50 for the first, \$30 for the second, and \$20 for the third—the Committee appointed for the purpose, consisting of Dr. J. W. THOMPSON, of Delaware, and Judge CHAMBERS, Messrs. C. B. CALVERT, A. BONIE DAVIS, and N. B. WORTHINGTON, of Maryland, unanimously awarded to the following the first PRIZE.]

In submitting the following Essay upon the "Renovation of Worn-out Lands," it is deemed proper to state, that the writer understands the main object in view of the Editor of the American Farmer, to be the eliciting of such information as is best adapted to the wants of the great majority of farmers; those who are dependent on the product of the soil for a support, and whose resources are comparatively limited; for although it may be equally desirable to those with more ample means, to improve their lands at the least expense of time and money, yet the number of such is comparatively small; and it is not perceived why the same plan may not suit both—the one who "lives by the sweat of his brow" improves his ten acres, while he with the "plethoric purse," may in the same time, enrich his hundred acres. With the view, therefore, to adapt it to the more numerous class of readers, the effort will be made to condense the essay as much as possible; and so plain, and free from technicalities, that "he that runs may read."

It is almost impossible to establish a theory, or mode of farming, that can be made to suit alike, all localities—of soil, climate, and the facilities of obtaining the various kinds of manure, now in use in different sections of the country. But it is believed that with proper energy and industry on the part of farmers, and even with the present facilities of transportation, an increase of double, if not quadruple the lime, marl, and bones might be used to advantage; the two former, in many sections of our country are inexhaustible for generations to come; and a much greater amount of the latter might be obtained in sections where they are not used, but greatly needed, if more attention was paid to their collection and preservation.

The first step I would advise towards the "Renovation of Worn-out Lands," is a complete and thorough draining, both surface and under drains, where the location and nature of the soil renders it too retentive of moisture late in the spring. It returns early seeding—the winter grains and grass roots are very liable to be thrown out and injured by frosts; and on such land, the drought is much more severely felt. The writer has not known a case where this operation was performed with ordinary skill and judgment, that did not fully repay the expense; and in some cases the product was increased from five to ten fold.

To go into a full description of the methods used in different sections, to accomplish this most important branch of the husbandman's duty, would require diagrams, and also too much space; nor is it considered necessary; for in the "American Farmer," (which every tiller of the soil ought to possess) very fully and amply information may be obtained on the subject. A few general observations here, may suffice. If the soil is rendered too wet by springs, whose sources are lower than the surrounding land, the drains must be extended to at least the same level, be the distance deep below what they may; or to a sufficient depth below the surface, to admit of under-draining clear of the plough. This may sometimes be effected, by going through the clay sub-soil, and without much expense of ditching; as the water can then pass off thro. the under-stratum of gravel, or sand.

Wherever the under drains will answer the purpose, they should be adopted; for the land thus reclaimed is often the most profitable for cultivation; and where the expense of brick, or tile, is too great, or suitable stone cannot be had to construct trunk drains, a good substitute is generally within reach, by 12 to 15 inches in depth of small loose stones; covering first with leaves, straw, or small brush, to prevent filling the interstices with the returned earth. Logs or poles, laid lengthwise, also form good under drains; but are more liable to clog from decay.

The next important step in my opinion, in "Renovating Worn-out Lands," is to plough deep, and thus expose a new surface to the action of frost, and atmospheric influence, in order to make a soil in place of the one provided by nature; but which either from cupidity, or bad management—perhaps both—man has destroyed. It is considered one of the most certain means to attain this desirable end; and although sub-soil ploughing is fully approved of, it is considered less important than to break up the earth from 7 to 10 inches, if the subsequent treatment is properly attended to.

The writer is well aware, that there is a strong feeling of prejudice in minds of many individuals, against this practice. What are the arguments of the advocates of shallow ploughing? They say in so many words, "our soil is only a few inches deep, and if we do not plough shallow, we shall turn up so much clay or dead earth, as to raise an crop at all." If two or three inches of soil is buried in the spring, under a bed of 5 or 6 inches of clay, and thus left without further aid, or preparation for a crop that season, the result would generally be, as stated. That shallow ploughing, enables the farmer to get clear much more readily of the little soil or mould, that either in a very wet or very dry season, may have on his worn-out lands, is susceptible of easy demonstration; nor is it less so, than either in a very wet or very dry season, the crop from the cause, generally suffers.

During the summer months, the greater portion of the rains fall hastily; and when the ground is not opened and portions to sufficient depth to penetrate the whole, before the water can imbibe, and be absorbed by the compact sub-soil, a large portion of the surface becomes fluid, and rapidly passes off,

or "washes away," unless the land is perfectly level. What remains, after being so thoroughly saturated, has a tendency to settle into a compact mass; soon parting with its scanty supply of moisture under a hot summer's sun, and rendering it impervious to the roots of plants. If a drought succeeds, a soil in such a state, can afford but a meagre supply of moisture to nourish a crop; and at a period too, when the greatest amount is needed. Nearly all the plants imbibe more or less moisture from the earth by their roots; and if this support is withheld, they cannot continue in a healthy and vigorous state; indeed so necessary is this element, that many of our grass seeds, and plants, will not only vegetate, but grow vigorously for a considerable period, with no other support to their roots, than what can be deprived from pure water.

I am confident that in most of our lands that have become sterile, the cause is to be attributed, more to shallow ploughing, and washing away of the little soil they possessed, than to the extraction of the vegetable nutriment, by the growth of plants; in fact it is almost a necessary consequence of this pernicious practice. If the tilling farmer or planter is able to purchase a dressing of mineral manure, or fortunate enough to scrape together a scanty supply of vegetable matter from the resources of the farm, a large portion of it is carried off by the first dashing rain, to enrich still more, the beds of creeks and rivers.

Having stated some of the disadvantages which attend shallow ploughing, we will now briefly enumerate some of the advantages of deep ploughing, when judiciously pursued.

In the successful cultivation of all our crops, it is necessary that ample food be provided, and in an accessible form; and that moisture, equally necessary, be administered, in neither too great nor too small quantities. This will probably be admitted by all, and it is presumed the admission will also be made, that the greatest amount of nourishment derived by all our field crops is from the earth. By deep ploughing, it rarely occurs that a fall rain is so great or sudden, as completely to saturate the body of earth acted on by the plough; and until such is the case, but little danger is to be apprehended of "washing away;" and just as little, that the plants will so soon receive a renewal of moisture, caused by evaporation. The soil much longer retains its loose and friable texture, and enables the roots readily to extend in all directions, in search of their appropriate nourishment; for the same reason, deep tillage admits of closer proximity of the plants, without sustaining equal injury from drought, and turning yellow; or, fringing, in common parlance.

I would ask the advocates of shallow ploughing, or the skimming system, as it has been aptly termed, if they have not observed the beneficial effects, of earths taken out of cellars, wells, pits, &c., when applied to very poor land? And have they not observed a luxuriant growth of grass and weeds on ditch banks and mill races; even to the highest points, when level enough to retain the moisture that falls? I have often noticed such effects; and have almost uniformly observed, that if earth thus taken from below the surface, was capable of being pulverized by frost or tillage, increased fertility was the result.—Such being the case, is there any valid reason for supposing, that still nearer the surface, so much difference can exist, that while one ploughs the same land sterile, the other will positively enrich it? If advantage will result from mixing with the soil, the earth taken from many feet below the surface—and that such is the case I have had repeated evidence, and using it for this express object—I cannot perceive why a portion of the same fertilizing property may not be found in the earth, only a few inches or a foot below the surface.—And last, though not least, in the catalogue of advantages, the all important item of manure, is rendered more available; and consequently, the land is both immediately and permanently benefited.

But deep ploughing alone, much as it is advocated, will not speedily make poor land rich. It also requires some judgment when, and to what extent it should be carried. Lands that are to be ploughed much deeper than usual, should be broken up in the fall; no crop should be seeded the ensuing season, that does not admit of frequent ploughing or harrowing; and if practicable give it a dressing before planting, (unless previously prepared for the operation, by liming a year or two in advance) of lime, or some other kind of manure.

These two branches, viz: Draining and Ploughing are considered important in the system of renovation, and more might be added, but perhaps sufficient space has been devoted to them, with the further remark, that to land with a clay sub-soil, should be ploughed either deep or shallow, when in a state too wet to crumble or break freely before the plough. The injury is irreparable, at least for that season, as nothing short of a winter's frost will effectually pulverize it.

We will now proceed to the third important step in the process of "renovating worn-out lands." The proper kind, and application of manures; viz: stable manure, and vegetable matter produced by the farm; lime, marl, bones, ashes, guano, plaster and turning in green crops.

It may be considered almost an axiom in farming operations, that no one should go in debt for any kind of manures, unless in favored situations where the price is very low, and the transportation cheap, (except perhaps for lime) without first having fully availed himself of all his own resources; and his manure heap too, should be his first care. No farmer need ever be at a loss for profitable employment for himself and hands in adding to his stock of this all important requisite to successful operations; and in preventing the loss and waste of what is already accumulated. When not necessarily otherwise engaged, the time is well employed in many situations by hauling the rich earth, and decomposed vegetable matter, which has accumulated in the marshes, leaves, weeds, &c., and incorporating them with the contents of his barn yard; independent of their own fertilizing properties, they are valuable as absorbents, to receive and retain the more volatile ingredients that otherwise

might be lost in the process of fermentation and decomposition; a few bushels of plaster may be used with much advantage for the same object.

It was the maxim of a wise man, who began the world with nothing, and became independent—and that too, without the charge of dishonesty, or extortion ever having been alleged against him—that "a penny saved, is two pence gained." It is emphatically true, with regard to the saving, and judicious application of manure.]

As an evidence of what care and attention in regard to making and saving manure will accomplish, it is within the knowledge of the writer, that two loads of manure (with two yoke of oxen) have been hauled out this season, for every acre of arable land on the farm; and with a small exception, produced on the farm itself, without extraneous aid.

As germinate to our present purpose and object, I will here remark, that many farmers whose lands most require "renovating," keep too many horses; in nineteen cases out of twenty, and for nearly all farm purposes, one or two yoke of Oxen are decidedly preferable. They cost no more at first, and will perform twice the labor; save in expense of harness, and still more in keeping; and after working 5 or 6 years under good management, are usually worth more than the first cost, for the shambles.

Marl—I can say but little from experience, in the use of calcareous manures; but am fully satisfied both by information derived from others, and from personal observation, that wherever it abounds, it might be made a mine of wealth to the proprietor, and the adjacent districts which admit of water transportation.

The only apparent reason why they are not more so, is, either ignorance of its great fertilizing properties, or a lack of the necessary industry to become rich, when every facility for the purpose, is as it were, laid at their very doors. The quantity of marl required to the acre, to produce much beneficial result, does not admit of extended land transportation; but there are thousands, if not tens of thousands of acres, bordering on, and near tide water, both in this, and neighboring States, now thrown out as waste lands, because they will no longer yield even a stunted growth of vegetation; most, if not all of which, might readily be reclaimed by the judicious use of marl; and at one-fourth the cost per acre, that lands in the interior,—originally no better, if so good,—are made to yield 10 to 12 barrels of corn, or 30 to 40 bushels of wheat to the acre. I have been informed by some of the large landed proprietors—not owning, nor residing within less than 8 to 10 miles of the marl beds—that a boat load of a thousand to twelve hundred bushels of marl, rich in carbonate of lime, could be delivered at many of their landings, at an expense not exceeding \$3 to \$10. Yet not one bushel was ever used!

But as was justly remarked, by one of these very intelligent and hospitable gentlemen, "it's no use to preach to a deaf congregation," and a further remark or two will only be added; not altogether without the hope that something will eventually "stir them up;" and induce a trial at least, of this valuable manure. It matters less, how when, or what quantity of Marl or Lime is applied; only MAKE THE APPLICATION, and that pretty liberally. Its application, like lime, is best made one, two or three years, and on the surface, before breaking up the land; and thus give it the benefit of the winter's frosts and snows to dissolve and incorporate it with the soil.

Lime.—This, next to the proper draining (when necessary) for even lime will not enable us to dispense with it and deep tillage. I consider the most certain and permanent agent in "renovating worn-out lands," of any other substance with which I am acquainted; whether mineral, animal, or vegetable; and when it can be obtained at a reasonable cost, even with some miles hauling in addition, it is generally to be preferred, if only one kind of "bought manure" is to be used. It may however be used freely in conjunction with all other manures, and with decided advantage, if done with judgment.

After many years experience in the use of lime, I would advise in all cases where it can be accomplished, to spread it on the surface from 1 to 3 or 4 years, before the land is broken up. The effect of a single winter's frosts and rains, will more effectually dissolve and bring it into action, and benefit the succeeding crop, as also the land itself, than is attained in a longer period, by ploughing it in as soon as applied. In this way also, a much larger quantity may be safely applied to the same land at a single dressing. As there is no loss to lime from atmospheric influence, it should be kept near the surface; and the proper quantity to use to the best advantage, can only be determined by the price, and the state the land may be in, at the time. With a good soil of grass roots to receive it, 100 or even 150 bushels to the acre, will do no harm; but on stiff clay, with little soil or mould on the surface, 50 bushels would be a very liberal application as a first dressing, if put on immediately after ploughing. It would be better to apply a less quantity at first, and repeat it as soon as an increased growth of vegetation could be obtained.

When lime is applied in very large quantities, and immediately incorporated with a poor soil, having little or no vegetable matter in it, the effect is to combine with the silicious particles,—abounding more or less in all clay soils—and form hard compact masses, that are not separated by years of arduous tillage. This mode, therefore, to say the least, is like "burying the talent;" for so much capital lies dormant, and neither benefits the farmer or his land. Twenty-five or thirty bushels as a first application, particularly if aided by even a light dressing of vegetable manure, will make a much quicker return for the outlay.

As to the *modus operandi* of lime much has been written; and various, if not conflicting theories put forth; nor do all agree as to the most judicious mode of application.

I consider it altogether unnecessary here, to attempt any explanation of the chemical changes produced in the soil by its use, or to give my own opinion on the subject, though formed after careful observation and from

years experience. To the inexperienced, however, it is of much more importance to be informed how to use it to the best advantage.—And as previously remarked, it is of still less consequence, how, or when applied, so THAT IT IS DONE.

Lime will act very beneficially, as I know from experience, on stiff tenacious clays, and so produce a state of sterility, as scarcely to reproduce the seed sown on them. But if used under such circumstances, and without the aid of any kind of manure, considerable time must elapse before much amelioration of the soil need be expected.

Theory without practice, does not often carry much weight with it; and on the mind of the farmer, generally speaking, it acts with less force perhaps than with most other classes in the community; for unless an array of facts, or good evidence, is adduced to inspire confidence, he is slow to change; the more so, when he knows that even a partial failure in a single crop, from experimenting, will be sensibly felt in his slender income, and perhaps for a year to come. This feeling, to a certain extent at least, is all right and proper; for experiments, to test any new theory, are best undertaken on a limited scale: time may be lost thereby, but money may be saved in the end.

I will now briefly give some account of the practical operation of my theory. My first application of lime to any extent, was 200 bushels, mostly air slaked, hauled 6 miles, and applied to 4 acres; just broken up for a corn crop, and harrowed in. This portion of the field particularly, was so thoroughly exhausted by previous bad management, that the yield of corn was only some 5 or 6 bushels to the acre; nor was the crop sensibly increased by the lime. As the main object in cultivation was to set the field in grass, the corn was followed by a crop of small grain, and a liberal supply of clover and timothy seed and plaster; the latter producing no visible effect whatever; and nearly all the grass seed perished, leaving the surface as bare as before. But before the field again came in course for cultivation, the good effect of the lime was so evident by the growth of white clover—a new variety in that vicinity—that I was encouraged to lime the whole field containing about 12 acres, and also including this 4 acres; put on as before, just after breaking up for corn. The crop on this portion, was increased fully 5 to 6 fold, over that adjoining, and but recently limed; thus liberally paying all expenses, and has continued ever since to produce profitable crops. Plaster now acts on it with marked effect. The first application was made some 48 to 19 years since; and to test the durability of lime, these 4 acres have been kept for experiment, and without the addition of other manure; except a portion, intended for still further experiment. About 2 acres were sown in broad cast corn, with 200 lbs. Peruvian Guano—then followed wheat on the 4 acres, and with 200 lbs. Guano to the acre, leaving 2 lands without guano.

The corn was materially benefited by the Guano; but the wheat was not benefited by the previous application of it, though it was nearly or quite doubled, over the two lands left without any Guano: the wheat was harvested two years since; and no one could now point out by the growth of the clover, uniformly good on the whole, and equally limed, which portion had and which had no Guano.—The conclusion is, that the "renovating" effects of lime, are thus far, TEN times as durable as Guano; how much longer remains to be seen.

Some nine or ten years since, I determined to reclaim an adjoining field, at whatever cost. It was sold long previous by one of my neighbors who sold his farm, and removed to the west, in order to settle on better land, that the attempt would be futile; or, if it ever was made productive, it would cost a great deal more than the land was worth. The prospect was forbidden; for the larger portion was as much reduced as could be, by shallow tillage, no manure, no grass seed sown, and constant washing, even to gullies, and producing little else than running briars. It was broken up in the fall and winter, to a much greater depth than it was ever ploughed before; sixty bushels of quick lime to the acre, was applied in the spring, the ground well harrowed and planted in corn; such portions as required it, having been well under-drained—some 2 to 3 acres—and which were about the amount that produced anything of a crop, or that more than paid the expense of ploughing. A crop of oats and grass seed followed; as it was not considered worth the trouble and expense to put in a crop of wheat, on 2-3 of the field. After 6 or 7 years, the same field again coming in course, exactly the same plan was pursued, as to ploughing and lime; but rather increasing the depth than otherwise.

The crop of corn though injured by the bad worm, was good—enabling me to do, what I rarely, or never done before, sell from 1-4 to 1-3 of the crop. Oats followed, on about 2-3 of the field, with some 5 or 6 bushels of bones to the acre, and wheat on the balance, with Guano: both heavy crops, and lodging over the greater part of the field. Then followed a wheat crop on the whole; manured as much as possible from the barn yard, and on the balance, a light dressing of guano of some 80 to 100 pounds to the acre.

The average yield of the field, was over thirty-three bushels to the acre. The results are attained with certainty;—for every field and lot are accurately surveyed, and the contents noted on the plat of the Farm; and the product of this field was kept separate, threshed, and manured by itself.—The greater portion suffered from the drought early last year; and the harvesting was badly done, owing to the fallen and tangled state of the grain from a storm, about the time of ripening; but I have no doubt, several contiguous acres might have been selected on the lowest ground (the portion under drained) on which the yield was over 40 bushels to the acre. This season, the same field yielded the heaviest crop of grass I ever harvested; and on what was originally the poorest part, there

is now a luxuriant crop of second growth clover, and intended for seed, that is lodging over the whole extent. We will estimate the profit and loss by figures:

100 bushels lime, cost at the kiln, 16 cents.	\$9.60
7 years interest (though it paid in pasture in less time.)	4.03
60 bushels of lime, cost at the kiln, 12 1/2 c.	7.50
3 years interest	3.00
6 bushels ground Bones, at 50c.	3.00
100 pounds Guano (African)	2.00
	\$27.48

CONTRA.	
By 33 bushels of wheat average price sold at 1.31	\$43.23
Estimated increase of corn crop, at least 6 barrels, at \$2; (and entirely owing to the lime.)	12.00
Estimated increase of Oat " crop 20 bushels, at 40c.	8.00
Estimated increase of Hay " 1 ton,	10.00
Estimated value of clover seed, (for there would not have been one without the lime.)	6.00
1-1/2 bush. at \$4,	79.23
	\$51.75

Making, in round numbers, \$50 per acre in favor of "renovating;" nor is the estimate a forced one. The actual increase of the crops is greater than the amounts assumed; and if a fair average was made of the wheat, in the joint crop of oats and wheat, the aggregate result would be increased some \$5 to \$6 per acre.

This opinion, so different from that entertained by some others, is not lightly formed, nor without several years careful observation; and also testing the matter by numerous experiments, and on a scale sufficiently extended, to prove the truth, or fallacy, of the doctrine held by some, that it is only a stimulant. Reference to one experiment may suffice, as they all tend to the same result, and nearly to the same degree.

In a field of some 10 acres, one acre was selected near the middle, and extending through the field, so as to embrace any difference of soil, should there be any. On this acre 200 pounds of Peruvian Guano, at a cost of about \$5.00, were sown with wheat. Adjoining the Guano on one side was manure from the barn yard, at the rate of 25 cart loads to the acre; and on the opposite side (separated by an open drain the whole distance) ground bones were applied on the balance of the field, at a cost of \$6.00 to the acre: the field was equally limed two years preceding. There was no material difference in the time, or manner of seeding; except that the manure was lightly cross-ploughed in, and the Guano and Bones harrowed in with the wheat.

The yield on the guanoed acre was thirty-five bushels, the adjoining acre with bone, as near as could be estimated by dozens, and the manured, about 24 bushels. The season was unusually dry; and the manured portion suffered more from this cause than either of the others; the land being considerably more elevated, and a south exposure.

The field has since been mowed three times; the first crop of grass was evidently in favor of the boned part; the second, and third, were fully two to one over the Guano, and also yielding much heavier crops of clover seed.—On a part of one land, 18 bushels to the acre of the finest of the bone were used; on this, the wheat was as heavy as on the guanoed, and the grass generally lodges before harvest, as it also does on much of the adjoining land with 12 bushels of bone.

The action and durability of Guano, probably vary on different soils, and although it may generally be used to advantage in aid of a single crop, I have as yet, no satisfactory evidence, that its fertilizing properties are very durable; unless applied in such quantities, as may in the end, "cost more than it comes to."

Guano should not be used with caustic lime, or ashes; nor very soon succeeding their application. It may with decided advantage be mixed with plaster, to fix and retain the ammonia; and for nearly, if not all crops, it is best to sow it broadcast, and plough in immediately.

Leached Ashes.—There are few, or none, who are ignorant of the value of this article as manure. But as the supply is rarely, if ever equal to the demand, much need not be said on the subject. At 8 to 10 cents per bushel, if the cost of transportation is not too heavy, they may always be profitably used; in durability they are next to lime, and the action immediate. Few comparatively, except within the vicinity of cities or villages, or those with water or rail road facilities, can procure, or afford to use them.

Poudrette.—Much profit has not yet resulted in the use of this (the merchantable) article, so far as I have observed its effects on my own, or the crops of others. Such as I have purchased, has as yet produced but slightly beneficial results on the crops to which it was applied. Its fertilizing property was diffused through such a mass of inert matter, that I concluded with half, if not one-third of the expense, more benefit might be derived from the purchase of some other kind of manure.

In the neighborhood of cities, where a supply can be obtained without much adulteration, its use may be made very profitable.

Turning in Green Crops.—This plan of "renovating worn out lands," has long been advocated by many. I have also given it a fair trial; and with the exception of Clover as the green crop, little advantage has resulted from its adoption; very poor land, without some extraneous aid, will not produce a green crop worth turning in.

I prefer its use, following the lime, and on the oat crop; at the rate of from 6 to 10 bushels—or as much more as the renovator may please, for an increased quantity will do no injury. On the wheat, succeeding the oats, my practice is, to apply a light dressing of Guano—say 80 to 100 pounds to the acre, to mature and perfect the grain; and only on such portions of the field, as the manure from the barn yard will not extend to. By the time the clover requires the aid of the bone, it will have become sufficiently disintegrated and incorporated with the soil, to give the clover a vigorous start; and its effect on the grass crops, is generally more durable than the vegetable manures.

The supply of ground bone is a limited one; but when to be had at a reasonable price (usually selling at 40 to 50 cents the bushel) it may be used to advantage on all crops and on all soils; but with decidedly less advantage, after passing through the alembick of the glue manufacturer; (as I have proved—at least to my satisfaction); thus depriving it of much of its fertilizing property. It is usually harrowed in with seed, as it loses less by exposure to the atmosphere, than most kinds of putrescent manures.

Guano.—This is one of the most active of all manures; and if the price would justify the application in sufficient quantities, it might aid very materially in "renovating worn out lands." But considering the evanescent nature of its most active principle ammonia, and the present high market price, viz: the Peruvian, at \$60 to \$70—and the more inferior kinds at \$45 to \$55—for the ton of 2000 pounds, it is much doubted whether the ultimate advantage, calculated on by many, will be realized. If the Peruvian could be obtained at about half this price—and it is believed such would be the case with a fair competition in the Peruvian market—the case might be different.

The writer has made liberal use of Guano, and generally to profit, as to the immediate return; but in no case has much benefit been derived beyond the first crop; and rarely has any material effect perceived after the second year.

This opinion, so different from that entertained by some others, is not lightly formed, nor without several years careful observation; and also testing the matter by numerous experiments, and on a scale sufficiently extended, to prove the truth, or fallacy, of the doctrine held by some, that it is only a stimulant. Reference to one experiment may suffice, as they all tend to the same result, and nearly to the same degree.

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Guano should not be used with caustic lime, or ashes; nor very soon succeeding their application. It may with decided advantage be mixed with plaster, to fix and retain the ammonia; and for nearly, if not all crops, it is best to sow it broadcast, and plough in immediately.

Leached Ashes.—There are few, or none, who are ignorant of the value of this article as manure. But as the supply is rarely, if ever equal to the demand, much need not be said on the subject. At 8 to 10 cents per bushel, if the cost of transportation is not too heavy, they may always be profitably used; in durability they are next to lime, and the action immediate. Few comparatively, except within the vicinity of cities or villages, or those with water or rail road facilities, can procure, or afford to use them.

Poudrette.—Much profit has not yet resulted in the use of this (the merchantable) article, so far as I have observed its effects on my own, or the crops of others. Such as I have purchased, has as yet produced but slightly beneficial results on the crops to which it was applied. Its fertilizing property was diffused through such a mass of inert matter, that I concluded with half, if not one-third of the expense, more benefit might be derived from the purchase of some other kind of manure.

In the neighborhood of cities, where a supply can be obtained without much adulteration, its use may be made very profitable.

Turning in Green Crops.—This plan of "renovating worn out lands," has long been advocated by many. I have also given it a fair trial; and with the exception of Clover as the green crop, little advantage has resulted from its adoption; very poor land, without some extraneous aid, will not produce a green crop worth turning in.

I prefer its use, following the lime, and on the oat crop; at the rate of from 6 to 10 bushels—or as much more as the renovator may please, for an increased quantity will do no injury. On the wheat, succeeding the oats, my practice is, to apply a light dressing of Guano—say 80 to 100 pounds to the acre, to mature and perfect the grain; and only on such portions of the field, as the manure from the barn yard will not extend to. By the time the clover requires the aid of the bone, it will have become sufficiently disintegrated and incorporated with the soil, to give the clover a vigorous start; and its effect on the grass crops, is generally more durable than the vegetable manures.

The supply of ground bone is a limited one; but when to be had at a reasonable price (usually selling at 40 to 50 cents the bushel) it may be used to advantage on all crops and on all soils; but with decidedly less advantage, after passing through the alembick of the glue manufacturer; (as I have proved—at least to my satisfaction); thus depriving it of much of its fertilizing property. It is usually harrowed in with seed, as it loses less by exposure to the atmosphere, than most kinds of putrescent manures.

Guano.—This is one of the most active of all manures; and if the price would justify the application in sufficient quantities, it might aid very materially in "renovating worn out lands." But considering the evanescent nature of its most active principle ammonia, and the present high market price, viz: the Peruvian, at \$60 to \$70—and the more inferior kinds at \$45 to \$55—for the ton of 2000 pounds, it is much doubted whether the ultimate advantage, calculated on by many, will be realized. If the Peruvian could be obtained at about half this price—and it is believed such would be the case with a fair competition in the Peruvian market—the case might be different.

The writer has made liberal use of Guano, and generally to profit, as to the immediate return; but in no case has much benefit been derived beyond the first crop; and rarely has any material effect perceived after the second year.