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The Growing of Lucerne

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Lucerne for the Dairy Farm

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seed was sown in June, and before sowing the land was harrowed from time to time to encourage weed seeds to germinate. The soil was then thoroughly cleaned and cultivated just before the crop was sown. The seed used consisted entirely of the Provence variety. Otherwise the arrangement of the experiments was the same as in 1924.

So far as one can judge, the crop at three of the four centres appears to have established itself. A cutting was obtained at all three centres at the end of the first season. In one case (at Kildinny) the yield of the inoculated limed plot was 35 cwt. per acre, which is highly satisfactory. At the other two centres the yield of the corresponding plot was under 1 ton. These results are more promising than those secured in 1924 and lend some support to the view that the modifications introduced in 1925 have had a beneficial effect. At the fourth centre the failure is attributed to the fact that the soil was too heavy for this crop.

Our experience with lucerne therefore indicates that on soils adequately provided with lime a satisfactory crop can often be grown without inoculation. On soils with a distinct lime requirement the beneficial effects of liming and inoculation have been demonstrated and promising yields have been obtained in certain cases. Late sowing with thorough preliminary cleaning and cultivation of the land seems to be of value in establishing the crop. From the practical standpoint the greatest drawback appears to be the uncertainty of obtaining a satisfactory yield the first season. The work will, therefore, be continued with a view to trying to overcome this difficulty. An attempt will also be made to obtain further data on the yield obtainable on soils adequately provided with lime.

LUCERNE FOR THE DAIRY FARM

By J. MACKINTOSH, N.D.A., N.D.D.

The National Institute for Research in Dairying

THE value of lucerne as a forage crop has been recognised and the crop largely grown throughout the southern countries of Europe for many centuries. It appears to have been introduced into England in the seventeenth century, and its cultivation on suitable soils slowly spread throughout the South-Eastern counties. Marshall, in his *Rural Economy of the Southern Counties*, published in 1798, mentions that the cropping practice of the district of Maidstone and also of the Isle of Thanet is distinguished from that of other parts of England by the frequency with which lucerne is grown in small fields, "not, however, standing in rows with hoon intervals, as in other countries,

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but growing at random, as sainfoin, clover and other cultivated herbage."

The main purpose for which lucerne was then grown was for cutting and feeding green to horses in the stable during the summer, and it was only after the nineteenth century was well advanced that this crop came to be recognised as specially suitable for the feeding of dairy cows. Appreciation of its value for this purpose was doubtless stimulated by the reports published in *The Journal of the Royal Agricultural Society* and elsewhere of its popularity on the dairy farms in France and other countries. In 1885, however, the area under lucerne in England and Wales was only about 14,000 acres; during the ten-year period 1894 to 1904 the area rose to 55,700 acres, in 1922 to 57,900 acres, and in 1925 to over 60,000 acres.

The early advocates of lucerne growing laid special stress on the drought-resisting powers of this crop and on the number of cuts which could be obtained in one season, and little was said about its nutritive value beyond the general statement that horses and other stock thrive well on it.

At the present time those who press the claims of lucerne as a forage plant and who desire to see a greatly increased acreage grown in this country, especially on dairy farms, lay stress on its valuable qualities in three different aspects: firstly, its value as food for cows compared with other similar crops; secondly, its rapid growth after the first year and power of giving three cuts annually for four to seven years or even longer, independently of the weather conditions; and thirdly, its importance as a nitrogen-collecting crop, thus enriching the soil during its growth, and making the application of dung almost unnecessary for several years after.

From the point of view of providing food for stock, lucerne can be made into hay, cut green as a soiling crop, or cut, chaffed and made into silage. When made into hay the food value of the product naturally varies considerably according to the degree of maturity of the crop when cut and the methods employed in making the hay. The leaves are the most digestible and nutritious part of the plant; hence great care should be taken to preserve the leafage as much as possible. The chemical analysis of lucerne hay as given in *Rations for Live Stock*, published by the Ministry of Agriculture, shows that when the crop is cut for hay before it is in flower the percentage of digestible crude protein is higher than in any other kind of hay, with the exception of that made from tares cut at the same stage of growth, and also higher than in any home-grown cereal grain. If the lucerne is in full flower at the time of cutting, the percentage of digestible protein is somewhat reduced, but is still higher than in any other common hay, and equal to any of the cereal grains except wheat.

A hay of the above quality is, therefore, a valuable source of protein for growing stock and for dairy cows, and a good supply will lessen appreciably the need for purchased concentrates—for example, 14 lb. lucerne hay (cut when the crop is in full flower) and 30 to 40 lb. mangels require to be supplemented only by 1 to 2 lb. crushed oats or other cereal to provide a ration for maintenance and the first gallon of milk, whereas 14 lb. average quality meadow hay and 30 to 40 lb. mangels require to be supplemented by 1 lb. decorticated ground-nut cake and 1 lb. crushed oats to provide a ration of similar protein content.

Lucerne is even more valuable as a soiling crop on a dairy farm, because, after a first cut has been taken and made into hay, as a rule two other cuts can be obtained, one towards the end of July, when the pastures often are bare, and another in September. A moderate crop of lucerne will give at each cut about 5 tons green forage per acre, and if 35 to 40 lb. per head daily be allowed, 1 acre will suffice for twenty-eight cows for ten days in July and again in September; or in other words, 1 acre will provide about 40 lb. green fodder daily for seven cows for almost three months during the driest part of the year. Further, in a moist season, when there is more grass and less need for forage crops, any surplus can be made into hay or silage, according to the weather conditions at the time the crop is ready to cut. It must also be remembered that lucerne hay is richer in lime and phosphates than any other dry fodder, and green lucerne is richer in these constituents than any other succulent food, with the exception of sugar-beet tops. It is probably better that cows should receive their mineral matter through a crop than in the form of mineral supplements to the ration.

The duration of a lucerne ley, once it is properly established, may be anything from four to seven years, and the possession of 5 to 10 acres of a crop which provides three cuts of good hay or forage or silage annually for this length of time should be invaluable on many dairy farms where it is at present unknown. Results up to this standard cannot be obtained without care in the preparation of the seed bed, cleaning before and after sowing, suitable manuring, and some surface cultivation year by year; but operations of this nature *have* to be carried out annually to a greater extent for almost every other crop, so that over the duration of a good ley the cultural operations are materially less than where the land is under a rotation of crops. There is, however, still need for a considerable amount of experimental work to find out the best methods of stimulating the plant during the first year of its growth, and the safest and most efficient after-treatment to prevent the ley becoming overrun by weeds.

The effect of a lucerne crop in increasing the fertility of the

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soil on which it is grown, by increasing the nitrogen content thereof, adds to its value, not only to the dairy farmer, but to all who wish to increase the fertility of their farms. A crop with the persistency and productivity of lucerne would be of great agricultural value even although it diminished the all-round fertility of the soil on which it grew. We should therefore appreciate it all the more when the most expensive manurial ingredient—nitrogen—is greatly increased in amount and the soil improved in physical condition by its growth.

The above summary of the many virtues of lucerne, most of which have been known in this country for at least fifty years, almost inevitably gives rise to the question, "Why is it not grown to a much greater extent than at present?" Perhaps the commonest answer to this question is that it is by no means easy to ensure a good plant. There have been many failures, and the local history of one failure is likely to be quite as widely known as that of a success.

The discussion on this subject which is to follow may therefore be more helpful if I add a short statement on the experience which we have had in attempting to grow lucerne successfully on the farm of the National Institute for Research in Dairying.

In 1922 a field of 8 acres was sown with lucerne in August. The field was clean but not in good heart, and before drilling different manurial dressings were applied to a number of plots. No definite results were obtained on any of these plots, and throughout the field as a whole the lucerne was slow in establishing itself. In the following year there was a very thin plant of lucerne and annual weeds grew freely. The crop, such as it was, was cut out for hay in July, and the yield was estimated at from 5 to 7 cwt. per acre. This return was very disappointing, and in the autumn the question arose as to whether the field should be ploughed up, or the lucerne left for another year. The latter course was decided on, and in the autumn of 1923 the whole field was cultivated both ways to a depth of 2 to 3 in. and afterwards harrowed. This treatment led to a great improvement, and in 1924 a useful crop of hay and a second cut of green forage was obtained. The autumn of 1924 was too wet to permit of cultivation, but in March 1925 another vigorous cultivation and harrowing was given, and a still better crop was obtained than in the previous year. On one side of the field, where only straggling plants and spaces bare of lucerne were to be found in the autumn of 1924, lucerne sprang up thickly and covered the ground effectually. A good crop of hay was obtained in May, a cut of green fodder for cows in July and August, and another in September and early October.

Had the lucerne ley been ploughed up at the end of the first year, as was advised by some observers, no return would have been

obtained for the preceding twelve months, but by surface cultivation the plant was apparently stimulated, and a good return, considering the nature of the soil, has been obtained during the past two years, with every prospect of obtaining a similar return for one or two years more.

Our experience of the severe competition which the lucerne met with from weeds during the first year of its growth led us in 1924 to lay down a series of plots in order to get further information on the effect of surface cultivation after sowing. For this experiment an area of about 4 acres was selected which was considered to have been well cleaned and reasonably free from weeds. On 24th June the seed was sown; on four sets of plots it was broadcasted and on the other four it was drilled. On 12th July, one month after sowing, specimen plants were dug up to find, if possible, how far the root had penetrated. It was found that the roots had penetrated to a depth of at least 8 in. in this short period of time. A few weeks later, owing to a strong growth of weeds which had unexpectedly appeared, the whole area was run over with a mower and the produce carted away.

Immediately afterwards one-third of each drilled plot was hand-hoed, one-third harrowed three times, and one-third untouched. Of the broadcast plot one-third was left untouched and two-thirds harrowed three times. During the spring and summer of 1925 the competition from weeds became more severe and the plant as a whole was disappointing. Those plots which had been hand-hoed showed a better and stronger growth of lucerne than any of the others, while those which were harrowed were superior to those which had received no treatment. There was no evidence that the harrowing of the plant within two months of sowing had done any harm, and it appears probable that the weed competition may be materially lessened by surface cultivation at this early stage.

In this experiment and in the 8-acre field previously referred to there was no failure of seed. A good plant of lucerne was obtained in the early stages, and the outstanding difficulty was that of keeping down the growth of weeds and of obtaining a reasonable yield of lucerne during the first harvest year. It must be recognised that lucerne does not develop quickly, nor attain its maximum until the second or third year, but nevertheless the produce during the first year should surely be equal to a moderate crop of hay.

Both the fields referred to above received about 20 cwt. ground lime per acre previous to sowing the lucerne, but no inoculation treatment was carried out. On an adjacent field in the farm the previous occupier had grown a useful crop of lucerne, and it was therefore considered that in our attempt to grow this crop we should, in the first instance, proceed independently of inoculation in any form.

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On many occasions I have discussed with dairy farmers the advisability of growing a small area of lucerne, and frequently I have been met with the complaint that when they had tried it they had been able at first to get a satisfactory plant, but were very disappointed with the first year's growth. Apparently, therefore, before the acreage under lucerne can be materially increased it is essential to find out by what methods of cultivation competition from weeds can be kept down, and how a fair crop can be obtained during the first year. It may be that inoculation will aid materially in this respect, and a stronger growth in the early stages will thereby hinder weed growth. Dairy farmers and others will value greatly any assistance or advice which will increase the return during the first year of the plant's growth.

LUCERNE GROWING IN HIGH AND WET DISTRICTS

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LUCERNE is grown only to a very small extent in the Western counties. In Wales, for example, it is almost entirely confined to a small area in South Glamorgan. During recent years several half-hearted attempts have been made to introduce it into other districts, but without much success. Why is lucerne, which is generally acknowledged to be the best fodder crop in the world both as regards productivity and feeding value when grown under suitable conditions, not grown to a larger extent in districts such as Wales, which are devoted mainly to stock-rearing?

There are several reasons for this: the most important are the absence of lime in the soil, high rainfall, and the fact that the growing of lucerne is often undertaken without the full appreciation of the special requirements of the crop. Thus, for example, it is not an uncommon practice to sow lucerne with a seeds mixture under oats or barley, regardless of the soil and weather conditions of the district. It has been repeatedly shown by various experiments conducted in different counties that under conditions prevailing in Wales lucerne is nearly always a complete failure when sown in this way. In an experiment conducted at Aberystwyth, in 1922-1923, lucerne was sown in a very simple mixture consisting of 5 lb. of tall oat grass, 7½ lb. of an early red clover and 15 lb. of Provence lucerne per acre. The soil was deficient in lime and phosphates. The phosphates were made good by the application of slag at the rate of 6 cwt. per acre. Though the seeds germinated quite well, lucerne