ROTHAMSTED RESEARCH

The Culture and Manuring of Fodder Crops

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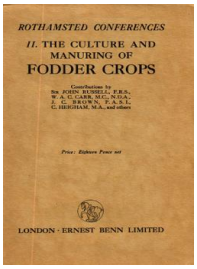

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W. A. C. Carr

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THE CULTIVATION & MANURING OF SWEDES & KALE

By W. A. C. CARR, M.C., N.D.A.

Cheshire School of Agriculture

Swedes belong to that unfortunate crop which is designated "roots." I say "unfortunate" because they are liable to attack, and are frequently attacked, from every quarter. Insects and fungi are ready to destroy them in the field, and even the lucky roots which escape the frost and land in the turnip shed are in danger of being thrown out again if considered a menace to the yield of the dairy cow. From time to time we are told that the crop is old-fashioned and unprofitable, yet farmers stick to it with dour determination.

We are informed we can grow silage and forage crops if we find them more profitable than hay, but roots—no! One might well ask the question—Are roots doomed? Before we cut out roots, however, we must find a substitute. Have we a crop in these islands which will yield more dry matter per acre than roots, when grown under suitable conditions? Have we found a crop which will yield digestible dry matter at a lower cost for winter feed than roots, and have we a crop the cultivation of which will keep the land clean at less cost than roots, if kale be excepted, or included under the term "roots"? So far I have not found a substitute.

Discrimination is necessary, however, in the feeding of roots as with other feeds—even linseed cake has its limits.

Swedes thrive under rather dry conditions in the early stages of growth, but the crop requires a good deal of rain after the plants begin to meet between the rows. Suitable climatic conditions are essential for a full crop. Heavy soils and wet soils seldom yield profitable crops of swedes; soils of this nature are better under grass.

The inclusion in the rotation of a good ley will do much to render root-growing profitable. Even a heavy soil becomes more friable, and tends to get into the fine condition suitable for a sound crop of roots. The ley reduces the frequency of the crop, and club root is no longer a serious menace, unless soils are actually sour. The Aberdeenshire farmer can rely on a sound crop of swedes, and he is not unduly troubled with weeds. I admit the soil and climate are suited to the crop, but the six-course rotation containing a three years' ley plays no small part. It is unfair to blame the roots for the shortcomings of other crops in the rotation, and if the land becomes weedy and out of condition through corn-growing, swedes then appear to be an expensive crop.

It may be, also, that the ley has an effect on the feeding value

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almost invariably obtained a plant, which the others sometimes missed. The root area should receive attention early in spring. The plough furrow should be broken on the surface in order to prevent the drying out of the soil. I do not care for cross-ploughing later than March, as it tends to allow the drought to penetrate to the bottom of the furrow. Better results, in my opinion, are obtained by working gradually down by successive cultivations until the desired depth of tilth is obtained. A finer tilth results and moisture rises to the plant in dry weather. Experiments at Craibstone in Aberdeenshire show the importance of sowing the crop at the right time. The soil there is of a nature which does not readily dry out, and a plant can be obtained from late sowings.

INFLUENCE OF DATE OF SOWING ON YIELD

Date of Sowing	*Average of 5 Years*		*Average of 4 Years*	
	Swedes		*Yellow Turnips*	
	Tons	*Cwt.*	*Tons*	*Cwt.*
May 8th . . .	21	9	...	
15th . . .	20	15	28	2
22nd . . .	19	4	25	8
29th . . .	19	0	23	9
June 5th . . .	17	7	23	4
12th . . .	17	8	21	6
19th . . .	...		17	5
26th . . .	...		14	0

Practical experience in the area confirms my opinion that swedes and turnips are usually sown too late for full crops.

Conditions are different in England, and it is difficult to indicate when swedes should be sown. In Cheshire the evidence is very conflicting. Swedes sown early in April sometimes make an excellent crop, whilst swedes sown in May may fail. The result may be reversed another year under different climatic conditions.

Another experiment at Craibstone shows that turnips should be thinned out when the plants are small:

	Average of 4 Years	
	Tons	*Cwt.*
Yellow turnips—		
Early-hoed .	21	16
Medium-hoed .	19	10
Late-hoed .	16	11

	Average of 2 Years	
	Tons	*Cwt.*
Swedes—		
Early-hoed .	16	14
Medium-hoed .	17	6
Late-hoed .	17	5

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of the swede. Collins has proved that the ley improves the quality of oat straw.

The preparation of the land for swedes and kale is similar. I believe in thorough cultivation, though I am afraid I cannot quote authentic experiments which show an advantage. Surely, in the preparation of land for swedes, we find an opportunity to plough a little deeper than is usual in the autumn of the year preceding the crop? Ploughing should be done early, especially if the land is at all on the heavy side. The furrow should be set up so that it will withstand the weather and be exposed as far as possible to the ameliorating influence of frost. I am often asked the question: Should farmyard manure be ploughed in during autumn or winter, or should it be applied in the drill before seeding? I do not hesitate to reply that it should be ploughed in as soon as it is available, provided the condition of the soil permits. Heavy rainfall may wash away valuable ingredients, but too often the manure is exposed to the same danger as it lies unsheltered in the farmyard or elsewhere. When the root area is considerable and the land tends to dry out, the advantage gained in the spring usually outweighs the disadvantage of manurial loss. It is not advisable to plough dung in too deep. Where conditions permit, good results may be obtained by ploughing in the manure with a light furrow in the autumn, and following later with a deep furrow. The process may be reversed on dry land. One can plough a good furrow, harrow, cart and spread the manure, and then plough in with a light furrow. By adopting these methods the manure is sandwiched between the furrows in a way which should yield good crops. The difficulty, however, is the extra expense entailed by twice ploughing, and it is probable that the increase in crop will not always pay for the extra work.

Too much time must not be spent on intensive cultivation if it is likely to cause the work to lag behind. My experience in the North-east of Scotland and in Cheshire convinces me that the failure of a swede crop could often be prevented by having the spring work a little better in hand. Unfortunately we have to contend with a variable climate, and "the best laid schemes o' mice an' men gang aft a-gley." We must, however, allow a large margin for safety, as I feel sure it is a very important factor in the cultivation of the crop, especially in places where heavy soils dry out rapidly. Every other year, if not every year, one may see whole fields sown with swedes and turnips bare and brown in July. "Yes, if we had been only a few days earlier it would have been all right." How often have I heard this, and repeated it myself. I have observed a farmer with slipshod methods push ahead with the crop when more careful men stood aside to await better weather or perform another cultivation. The former often won, as he

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Although swedes do not show an increase in yield, hoeing can be done at a greater pace and weeds can be dealt with effectively in the early stages, whereas if hoeing is delayed, the work becomes very slow and cleaning is much more difficult. The same thing applies to horse-hoeing—do the work if possible before the weeds appear.

Experiments indicate that varieties of swedes vary in yield and composition, and it is difficult to single out outstanding varieties.

VARIETY TRIALS AT REASEHEATH, CHESHIRE

Variety	1923		1924	
	Yield (Tons)	*Per cent. Dry Matter*	*Yield (Tons)*	*Per cent. Dry Matter*
Magnificent . . .	31·5	9·0	37·4	10·6
Superlative . . .	29·0	8·2	33·9	10·9
Viking . . .	29·0	9·3	35·2	10·6
Feedwell . . .	28·5	9·2	31·3	10·9
Best of All . . .	27·5	9·5	...	...
Leighton's 16-week .	27·0	9·1	...	...
Model	26·5	10·0	...	...
Conqueror . . .	26·5	9·2	33·0	11·3
Lord Derby . . .	25·0	9·8	...	...
Eclipse . . .	23·5	9·9	38·2	10·5

TYPES OF SWEDES TO TEST FEEDING QUALITY—1923

Joint Experiment, Aberdeen, Edinburgh and Glasgow Colleges, and Rowett Institute

Variety	*Type*	*Aberdeen*		*Edinburgh*		*Glasgow*	
		Weight per acre Tons	*Total Solids* Per cent.	*Weight per acre* Tons	*Total Solids* Per cent.	*Weight per acre* Tons	*Total Solids* Per cent.
Aberdeenshire Prize	Purple North	14·6	15·4	26·2	11·2	...	10·2
Bangholm	Purple Globe	14·4	14·6	22·8	11·3	...	10·3
Best of All	Reddish Globe	16·0	14·3	32·4	10·9	...	10·1
Bronze Tankard	Bronze Tankard	17·2	12·6	23·4	9·9	...	9·5
Caledonian	Br. Globe	17·4	14·2	20·0	10·2	...	9·8
Darlington	Br. Green Globe	17·9	13·8	23·8	10·2	...	10·4
Kinaldie	Green Globe	14·2	16·8	20·0	10·9	...	10·3
Picton	Red P. Tankard	18·3	12·4	29·6	10·2	...	9·6
Stirling Castle	Purple Tankard	16·0	14·0	21·3	10·6	...	10·2
X L All	Bronze Globe	15·6	13·4	23·5	10·5	...	9·9

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Manuring of Swedes.—In the past it has been the custom in many districts to apply dung and a heavy dressing of artificials to swedes. It is doubtful if this is justifiable even in Scotland. The crop does not respond like mangolds and kale to manuring, and seems more influenced by season than manuring. We have been led to understand that swedes require a liberal dressing of phosphate, yet some trials give negative results.

Results of Trials at Reaseheath, 1922 and 1923. — All plots received dung in the drill in addition to sulphate of ammonia and muriate of potash. Phosphates equivalent to 3 cwt. superphosphate (35 per cent.) per acre was applied to all plots, except the "no phosphate" plot.

The following table gives the results expressed in tons per acre :—

	Yield	
	1922	1923
Phosphatic manure—		
No phosphate	13·1	26·3
Mineral phosphate . . .	12·0	27·4
Superphosphate . . .	11·3	27·4
Ephos	12·2	27·4

Effect of Season.—Swedes have been grown at Reaseheath under similar conditions each season, and the average yield in four successive seasons is as follows :—

1921—Crop failed owing to mildew.
1922—12 tons per acre.
1923—27 tons per acre.
1924—36 tons per acre.

Provided phosphates are applied to other crops in the rotation, it is unlikely that the swede crop will suffer, when once established, through a deficiency of phosphate. With a moderate dressing of dung, a light complete dressing of artificials containing soluble phosphate is advisable. This will give the plant a good start, which I think is important. If the crop tends to be restricted in growth by heavy rainfall in the early stages, a touch up with nitrate after singling may improve the yield.

When poor land is ploughed up, phosphate may prove the limiting factor, and soluble phosphate may be necessary. A small experiment on a farm lying in the smoky area of Cheshire gives interesting information on this point.

A plot of poor turf was carefully dug up for the experiment. Carbonate of lime and a dressing of nitrogen and potash were applied to all plots. The following yield of swedes was obtained :—

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No phosphate	1·4 tons per acre
Mineral phosphate . . .	2·9 ,, ,,
Superphosphate . . .	9·3 ,, ,,

My experience in Kincardineshire also favours the use of superphosphate—small dressings bring the plants on to the hoeing stage, whereas heavier dressings of insoluble phosphate often fail to give the plant the necessary start. Superphosphate may tend to favour club root, but an application of lime now and again will counteract this tendency.

Marrow-stem kale is more reliable than swedes at Reaseheath. Crops yield from 25 to 30 tons per acre—and so far have never failed. The yield of dry matter and protein is higher than that of swedes. Cattle eat it readily in the field or in the stall, it is the cheapest autumn feed I know, and it does clean the land. Although I have put in a good word for swedes, we have lately largely replaced the crop by kale at Reaseheath, but in the North-east of Scotland kale does not compare favourably with swedes.

The cultivation of kale is similar to that of swedes. We drill it in the same way with about the same weight of seed per acre—*i.e.* 3 to 4 lb. I am often asked: Should kale be thinned? I have tried it unthinned and at distances of from ½ ft. to 2 ft. apart, and, provided the unthinned has not been thickly sown, I have found little difference in the total yield. Cattle, however, do not take readily to very thick stems, and for this reason I prefer to roughly hoe as for swedes. The crop may be planted out after early potatoes, and for this purpose it is advisable to sow a few drills of kale alongside the potatoes so that plants are at hand when required. I have sown kale successfully in Cheshire from the end of March to the end of June. Marrow-stem sown early in April will be ready to cut, if required, by August; but sowings about the beginning of May are, I think, on the whole better for use in November and December. Thousand-head kale does not yield the same weight of crop as marrow-stem. It stands the frost better, and of course provides excellent fodder late in spring, but I generally find it gets in the way of the succeeding crop.

Kale responds to manure, especially on poor soils. A good dressing of dung is desirable, and in addition we apply 1½ to 2 cwt. sulphate of ammonia, 3 to 4 cwt. super, and 1½ to 2 cwt. muriate of potash or its equivalent. After thinning we usually apply a top-dressing of nitrate. We have not carried out a manurial trial at Reaseheath, so our manuring may be wrong, but we can rely on good crops.

In 1925 we had a small experiment at Taylor Fold, near Stalybridge, on poor soil, to test if top-dressing with nitrate after hoeing was profitable. All plots received dung and a complete dressing of

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artificials—1½ cwt. sulphate of ammonia, 3 super and 1½ muriate of potash:

	Tons per acre
Basal manure but no nitrate	16·0
,, ,, and 1 cwt. nitrate of soda . .	19·4
,, ,, and 2 ,, ,, ,, . . .	22·8

The crop being of a leafy nature responds to nitrogen, and it is possible we could have profitably increased the dressing.

Kale is now finding a place on many farms in England, and farmers seem satisfied with the crop. There is, however, a danger of over-production. The produce of 1 acre of marrow-stem kale will, I think, provide sufficient green stuff for fourteen or fifteen cows up to Christmas, after which I prefer swedes or mangolds.

FORAGE CROP MIXTURES

By J. C. BROWN, P.A.S.I.

Forage crops attracted considerable attention in this country during the eighteenth century when the ancient system of agriculture was breaking up and the system now practised was taking definite form; but the economic forces of the late eighteenth and early nineteenth centuries favoured corn production, and in consequence these crops almost disappeared from British agriculture. But it is of interest to recall that in several Continental countries—notably in districts in Germany—a forage-cropping agriculture continued steadily to develop during the last century, and has at the present time reached an advanced stage of progress. In recent years in the United States of America a very considerable live-stock industry has sprung up which rests almost entirely on arable forage crops. The crops and methods employed in these countries are not well suited to English conditions, but a considerable range of forage crops exists which can be grown successfully in this country, while others need but slight improvement to render them of great value. Examples of the latter are the flat pea (*Lathyrus sylvestris*) and Bokhara clover (*Melilotus alba et off.*); both these crops give very high yields of nutritious fodder, are easily cultivated, and are almost independent of soil conditions, but the rapidity with which the stems of the plants become woody in character and unpalatable to stock renders them practically useless in their present form. Similarly, maize and lucerne, which are so largely employed in the United States, are not adapted to general cultivation, at the present time, in this

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