ROTHAMSTED RESEARCH

Recent Developments in Market Gardening

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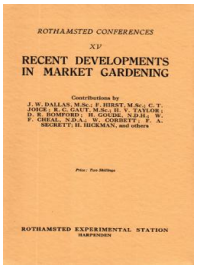

Discussion

H. V. Taylor; D. R. Bomford; H. Goude; W. F. Cheal; W. Corbett; F. A. Secrett; H. Hickman and Others

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DISCUSSION

H. V. TAYLOR (Ministry of Agriculture).—When this Research Station was established by Sir John Bennet Lawes and Sir Joseph Gilbert in the last century neither had any vision that one day the Station would be discussing horticultural problems and calling a Conference at which papers would be read on horticultural matters. Rothamsted, in its development, has concerned itself with soils and manures for the primary agricultural crops, wheat, barley, sugar beet, etc. and is now generally regarded as a Station for agricultural problems.

The horticultural industry is much younger than the agricultural industry and perhaps more progressive. It has provided such a host of problems calling for quick solution that it has been necessary to equip this industry with special research stations—Long Ashton Research Station and East Malling Research Station for fruit; the Cambridge Horticultural Research Station for vegetables, the Cheshunt Research Station for glasshouse crops; and the Campden Research Station for fruit and vegetable preservation. These Stations are working on the problems of horticulture and are deserving of whatever support the industry can give both at present and in the future.

Rothamsted, too, is helping the horticultural industry with its fundamental researches on soils, manures and plant pests and its work should be studied by all who raise crops from the soil.

In response to an invitation by Sir John Russell, I read a paper at a Conference held at Rothamsted in 1930 on "The Farm for Market Garden Crops." The chief object of that article was to show that bad times in agriculture were causing farmers in some measure to turn away from cereal and root production and to embrace that of fruits and vegetables and I sought to give some words of advice on a course so beset with pitfalls. Since then the times for the farmer have gone from bad to worse so the change over to vegetable crops has continued though the change was of a less degree in 1932 because wheat growing had again become attractive.

Confirmation for this is to be found in the Agricultural Returns for 1932, which show the acreage under crops on holdings above one acre in England and Wales as returned by occupiers on the 4th June, 1932. The acreage of wheat and sugar beet shows a large increase on that returned in 1931, but the acreage to barley, oats, rye, mixed corn, dried peas, roots, mangolds and swedes are all down.

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Much extra land went down to potatoes, broad beans, cauliflowers, carrots, onions, celery and rhubarb. The increase in acreage over that of 1931 to these crops is as follows :

Potatoes	56,900	acres
Green beans ..	1,200	,,
Green peas	3,300	,,
Cauliflowers	1,800	,,
Carrots	3,100	,,
Onions	400	,,
Celery	400	,,
Rhubarb	500	,,
	10,700	,,

Similar changes have occurred in other years.

Between 1922 and 1932, for instance, *no less an acreage than* 45,000 *acres have passed over from farm crops to vegetable production* (see page 5). Those accustomed to think of acreage in terms of agriculture may not be much impressed by this figure ; but crops in horticulture are heavy so that the extra food produced is substantial.

In terms of percentage it means that *the acreage to the crops mentioned has been increased by* 31 *per cent.* The acreage has been greatest in the crops of easy production—peas, cabbage, Brussels sprouts and cauliflowers ; the percentage increases of which have been peas 20 per cent., cabbage 18 per cent., Brussels sprouts, 124 per cent., cauliflower and broccoli, 70 per cent.

The supply of vegetables from the farms now such as that of Mr. Joice, has reached such a volume that the old time market gardener can no longer claim a monopoly ; indeed he, too, has to make changes in vegetable production as he once knew it, or retire from it.

High Cost in Market Gardening

Land used for market gardening is, as Mr. Wallace has shown, usually highly rented ; the manures are all bought and the workers paid wages higher than the standard wage of agricultural workers. Even for income-tax purposes the market gardener is treated more harshly than the farmer. The market gardener relies on much hard work : spade digging, hand planting and hoeing, so that it is a small wonder that his cost of production would be higher than the cost of production on farm land, machine tilled, and manured with home-produced dung and where the wages paid were at the standard rate. Mr. Joice's remarks fully confirm this.

Where the markets are not able to absorb all the produce that of the market gardener can only be used for manuring the land : whereas the farmer, as Mr. Joice explains, feeds his sheep on the cabbages, Brussels sprouts or carrot crops. The position is that farmers, such as Mr. Joice, can produce many vegetables and sell them at a lower price than the old established market gardener.

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The advent of the farmer as a vegetable grower is creating quite a situation in the market gardening industry and like other situations, this one also has to be met.

Changes in the Market Gardening Industry

A. *Intensification.*—There are about 46 or 47 vegetable crops and often 20 or so are grown on any market garden. The market gardener produces daily supplies of some kind of vegetable the year over so that it is a matter of no difficulty for him to adjust his programme of cropping so that the acreage to the unprofitable vegetables is curtailed and that of the profitable increased. Such changes are in progress. Many market gardeners are discarding the easy to grow vegetables—peas, cabbages and Brussels sprouts—and increasing their acreages to the finer vegetable crops (asparagus, seakale, early forced carrots and cauliflowers) and salad crops of all kinds. In short, the reaction of this type of market gardener is to greater intensification.

I think this is the direction that will have to be taken by the smallholders of Bedfordshire if they are to remain vegetable growers or they may be crowded out. Mr. Dallas has shown that the acreage to carrots has declined 40 per cent. in the past twenty years. Mr. Dallas said that once there was a tremendous trade in early bunched carrots in June and July but this is practically non existent. Actually the people of England are eating more and more bunched carrots than ever but the carrots are mainly glass frame grown in other countries (France and Holland). Greater intensification in production is needed to win this trade back and it can be done.

Mr. Dallas also refers to the loss of trade in pickling onions and outdoor grown *cucumbers*. By intensification or rather by greater specialisation that trade alone can be won back. The factories no longer pickle just any silver skin onion or any outdoor cucumber as they once did ; but they use only special stocks of onions and cucumbers that give pickles of the most pleasing appearance. The pickle trade is of even greater volume than formerly but it has become very specialised indeed. The onions must be snow white (not smoky) and the outdoor cucumbers must be very small gherkins. If our growers specialise in the production of these the trade can be won back.

B. *Mechanization.*—Other market gardeners attempt to produce peas, cabbage, Brussels sprouts, etc., but attempt to lessen the cost of production of these by replacing hand methods with machinery. Hand digging, hand planting and hand hoeing are giving way to tractor drawn ploughs and cultivators and planting machines so that hand methods are restricted almost to harvesting the crop. Mr. Joice has already shown you how he uses machinery to lessen the cost. To see mechanization carried to its fullest degree in vegetable production one has to turn to the large Lincolnshire farms where vegetables are being grown *on contract* for the canning factories. The contracts are made for the crops produced on many acres at an

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agreed price per ton. The farmer makes his profit by reducing the cost of production per ton. This has supplied the stimulus.

Only this summer I saw on one farm 700 acres of peas all grown for green peas for the factories. Every single operation was done by machinery. Ploughing, drilling, hoeing are easily done ; but on one farm the green pea haulms were mown down, piled on small trucks on a light railway and hauled to threshing machines which threshed out and separated the green peas from the haulm and pods.

This mechanization of production and harvesting was so perfect that the farmer could make a profit though he received but £18 per ton for the *shelled green peas*. By turning our brains to peas the costs of production have been brought down and the canning industry are now able to use the crop of from 3,000 to 4,000 acres.

If the same study were given to, and the same mechanization applied, success awaits with other crops. Take asparagus, most of our canned asparagus, 18,000 cwts. annually—comes from America and the English canning factories assure us they could use the produce of 1,000 acres of asparagus if it could be purchased at about 7d. per lb. The English growers say it cannot be produced at that figure mainly because the methods of production are hand methods. In the great plains of Sacramento all the cultural operations, earthing up, etc. are done with tractors and hand methods are limited to cutting. This asparagus is produced at less cost than the English.

D. R. BOMFORD (Evesham).—Mechanical developments in ordinary farming practice must necessarily affect market gardening, to the extent of bringing all cultivations undertaken before planting, and inter-row cultivations after planting, within the scope of machinery. This has been happening for several years and machines have proved their superiority to older methods in almost every respect, where the areas in question were sufficiently large.

To these developments have been added two types of machinery capable of doing (*a*) plant setting ; and (*b*) inter-plant cultivation as opposed to inter-row cultivation ; that is, (*a*) the work hitherto done by the peg, dibber, or setting pin ; and (*b*) the hand hoe. Thus in addition to all the ordinary conquests of the machine, the two last strongholds of manual labour in extensive agriculture are assailed.

It is unfortunate that in our present state of development the use of machinery in production should achieve such rapid progress, while the science of economics, on the progress of which the distribution of the wealth produced depends, is allowed to lag behind unnoted ; and in fact, to follow at its own slow speed. In this great and sudden increase in the potential output per man among land workers, we have a typical example of a change which may well produce economic confusion.

Corn production in this country has come to a point at which it is possible for each regular employee to produce as much as 150 tons of wheat per annum. Market gardening is moving in the same

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direction and it is well worth speculating as to what the economic outcome is likely to be.

In the first place anxiety must be felt with regard to the already hard pressed smallholder. No argument is required to establish the fact that his economic suppression would be a national disaster. Yet already hard pressed, what can he hope for ? unless engineers will turn their attention far more to the making of ploughing, cultivating, planting and hoeing machines, that can be used advantageously on a small scale, and manipulated by not more than two or three persons at the most. It is true some machines do exist, but in the opinion of the writer they are quite inadequate to the smallholder's general needs.

Secondly, what is likely to be the lot of many of the employees of farmers and market gardeners particularly the slower and less adaptable among them, to whom the statutory wage is already tending to become a disadvantage ?

Unfortunately the problem is as much or even more, one of distribution than of production. During the last few years we have seen potatoes so valueless wholesale, that they have been fed to cattle, and even left to rot in the bury. Cabbage ploughed in—sprouts—strawberries and other crops unpicked—so called over-production. Yet there has never been a time when some of those in the great consuming centres have not been hungry.

As the producing cost decreases, so does the distributing cost become large as a proportion of the price paid by the consumer. Already it costs, in some cases, more to distribute a food than to produce it. One comes, therefore, to a point at which reduction in production costs, without a corresponding reduction in other costs, is almost useless as a means of increasing consumption, and the grower in spite of all his efforts pays the severe penalty of so called over production, which would be better described as a failure of distribution. This problem we all recognise as being the stumbling block of nearly every industry to-day, and we also know that it is largely connected with the failure of our currencies to perform their function. The problem as applied to market gardening, however, has a special aspect, in that in this case it is particularly easy for the producer to receive nothing, while the consumer is still paying a relatively high price for the product.

Now as regards non-perishables such as potatoes, parsnips, carrots, artichokes, apples, turnips, etc., the problem does not appear to be insolvable if the producer can be educated into selling by the hundredweight as well as by the ton, and the consumer into buying by the hundredweight instead of by the pound. This would leave the harrassed and hard worked distributor more free to cope with the very difficult problem of the distribution of perishables, such as greenstuff and soft fruit. It may be pointed out that the perishables are all in the nature of luxuries and for such consumers can afford to pay highly ; on the other hand, the one hope of avoiding unemployment in a market gardening industry in which potential

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output per man is greatly increased, lies in creating conditions under which all are consumers of luxuries as well as necessities, and the only control the producer and distributor have over such conditions is by offering to the consumer at such a price, that the low wage earner can buy. In the case of the perishable it is easier to point to the necessity of the solution than to find it.

Generally speaking, there would appear to be two types of buyers. One will go to a highly decorative shop in a fashionable street ; in this case every Brussels sprout which leaves the shop has had to pay high rates, rents, management, ornamental and other charges. The other will go to an unpretentious shop where, in spite of low overhead charges, the turnover is so small as to make these charges excessive per pound sold. In the small shop particularly, the probability of a perishable residue is always liable to force the retailer to charge an additional sum on sold perishables to cover the loss on unsold ones. Is it beyond our ingenuity and enterprise to bring the efficiency and high turnover of the first type of shop, to large scale unpretentious buildings built where rent and rates are low, and to attract both types of customer to it, by sheer force of offering a good foodstuff at an attractive price ?

Secondly, it may be possible that the canning process will help to solve the problem of the disposal of an excess of perishable vegetables.

These are only small steps towards the solution of a pressing problem, which if we are to avoid disaster in the production personnel of the industry, call for the immediate and careful consideration of producer, distributor and consumer alike.

H. Goude, N.D.H. (Norfolk).—Mr. H. Goude, speaking during the afternoon session, said he had listened with very great interest to the points raised by the preceding speakers. If we viewed vegetable production from a national standpoint we would not fail to observe that the bulky vegetable crops were grown either near to the large centres of population, or in districts with easy facilities for transporting the crops to the markets. The only exceptions to this rule were specially favoured districts for early produce, as Penzance for broccoli, and our marshland district in Norfolk for spring cabbages, or other eminently suitable areas for the production of specialised crops. As far as Norfolk is concerned, the recent developments have been on the lines explained by Mr. Joice. Norfolk farmers have always grown vegetable crops for a possible market. If the price was satisfactory, the crop was sold. If no market was available, the crop would be fed to farm stock. With the loss of markets for farm crops in recent years, there has been a decided increase in vegetable crops grown on farms. The chief crops selected are carrots, savoy cabbage, Brussels sprouts, spring cabbage and broccoli. These crops are easily produced, and for that reason are selected by farmers who risk a few acres with these vegetables for a possible market.

As a county officer, responsible for advisory services in vegetable production, I have always pointed out the possibility of loss from

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this form of cultivation. During a severe winter, Norfolk vegetables are in demand, as vegetation is seldom severely injured by continued hard frost in the county. In a severe frost I have seen the sprouts and savoy crops sere and brown in Bedfordshire and Worcestershire, while our crops were still green and marketable. Vegetable crops are more profitable in Norfolk during severe winters.

The farms near the canning factories have reaped considerable benefit from the cultivation of green peas; about 1,000 acres are under this crop, which is grown on contract. The main varieties are Alaska and Lincoln. We also grow a large acreage of celery, mainly on the fen-lands; also beetroot and dwarf beans. The demand for these crops by canning interests is increasing. As we have eminently suitable soil for asparagus and seakale culture, the large-scale production of these crops is now proceeding, and is likely to develop into a considerable industry as the crops are in demand by canners.

The recent developments in production are the general utilisation of mechanical means for soil working and planting. Most of the brassica crops are seeded on the land where they are to mature, and planting is only employed to make good any failures in the plant. These large-scale and cheaper methods of production of vegetable crops have developed outside our regular market gardening districts. The smallholders and regular market gardeners have not been unduly pressed by competition from this source in our local markets, but there is the general tendency for the smaller cultivators to increase their fruit lands and also to erect glasshouses and frames for the intensive production of fruit, vegetables and flowers.

In several districts it is possible for smaller cultivators to hire tractors for ploughing and cultivation, at reasonable terms, and the ownership of small tractors for cultivation, is increasing among smallholders. Further developments on these lines place the smallholder in a more favourable position with productive costs when compared with the larger cultivator, and when he specialises in crops requiring higher skill and experience his position is as firm as the larger producer.

We can improve the demand for vegetables if we induce the cooks to prepare vegetables in a more appetising manner for the table. It is rare to have any properly cooked and served vegetables in hotels and restaurants.

Most of the papers and speakers referred to the decline of available supplies of manures.

The solution to the manuring problem is the development of pig-keeping. At our Burlingham Horticultural Station we have designed pig-sheds and trough yards expressly for the purpose of making the largest quantity of manure from each pig kept, and the results in manure-making have been quite satisfactory. We estimate that we make two loads of valuable manure from each pig fatted. This is done by littering the yards with straw and any vegetable refuse from crops grown on the Station. When this manure is made, it is run from the yards on to the land, and used for top dressing bush

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fruits, vegetable crops, and wherever it is required. This form of manuring is then supplemented with inorganic fertilizers, and thus the land is maintained in a high state of fertility. We think that pig-keeping is so intimately connected with high soil fertility that I would propose that this Conference sends a resolution to Councils, Committees and Associations responsible for the national organisation of the Pig Industry to accelerate their work in order that all the pork and bacon required by this country is produced here. This would save at least £50,000,000 per annum, would relieve rural unemployment, and make it possible for the economic production of all vegetable crops and also bush fruit crops of improved quality.

W. F. CHEAL, N.D.A. (Wisbech).—In the Isle of Ely little market gardening is carried out. Fruit growing has developed very much on the various types of silt and silt clays of the Wisbech district, and to a small extent on the southern borders adjoining the Histon—Cottenham area. The remainder of the county is chiefly black fen soil and is devoted to the production of main crop potatoes, sugar beet, and a little corn. Some celery is grown near Peterborough and around Ely.

The use of the motor has been one of the chief factors in the recent developments. As a means of transport it has ensured the delivery of fresh produce to the canneries, and it has brought the Wisbech strawberries within still better reach of the midland and northern markets *. This year supplies of strawberries have been sent by road to preserving works and canneries as far afield as Slough.

The smaller types of motor tractor promise to solve the difficulty of expense incurred in digging and cultivating the fruit plantations (gardens). For pest control and spraying purposes the motor pump is indispensable.

The dwindling supply of horse manure from the large towns has been caused by the introduction of motor transport. This is a big disadvantage, for the supply of humus to the lighter silt soils N.N.W. of Wisbech is important. Green manuring is sometimes adopted, and it is a very sound practice as a preparation for strawberries and potatoes.

Of the new systems of farming introduced around Wisbech as the result of the depression of the 'eighties, the production of the large-size cooking apple has held its own, and in view of the probable competition with market garden crops grown by farmers in other districts following the depression of recent years, it appears as if the cooking apple will continue to remain the best product of the Wisbech grower for some years to come.

W. CORBETT (Kent).—Much has been said about the mechanization of market gardening and the reduction of production costs in

* In the Research Monograph No. 6, "A Survey of the Soils and Fruit of the Wisbech Area" we read (p. 25) "coming from Kent to be nearer the best markets which he found were in the Midlands and the North, Mr. Bath took land at Wisbech, hiring the Osborne Farm of 150 acres."

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this way. A great deal can be done by mechanical aids, but there is a real danger of mechanization being taken too far ; the result of this might be that the land, originally clean, will become dirty, and weeds will become very serious competitors with the crop. In the cultivation of all market garden crops hand labour for cleaning the crops is indispensable, especially in the case of crops which are planted or sown at short distances.

In the industry to-day there is a dual tendency—first, to become less intensive, and second, to become more intensive. In the latter case, the change of fiscal policy of this country is bound to have a far-reaching effect, but how far may depend on how soon the growers can adopt the methods now being used in Holland and France. The growers obviously will not invest capital in the necessary equipment for carrying out this intensive culture until they are reasonably certain of success in the management and the financial result of such an undertaking. Much could be done by the Agricultural Education authorities in the various counties to help growers in this matter, especially by demonstrating the best methods.

In the future, electricity may play an important part in these intensive methods of vegetable production. With the present shortage of manure for making hotbeds, the Norwegian system of electric hotbeds may in the near future become a practical proposition.

Many problems connected with the market garden industry are awaiting the research worker, and of these the more important are the practical control of certain diseases and pests which take a yearly toll of certain crops, and a classification of vegetable varieties that will help to do away with the confusion which arises from the innumerable synonyms with which we have to contend at present.

F. A. SECRETT (Surrey) : Vegetable growers in the Home Counties have for some years realised that many of the crops which paid their forebears to produce have ceased to be a commercial proposition, and it has become a usual practice with growers who keep accounts to eliminate any crop which does not pay after a period of five years. Unfortunately, changes of methods in horticulture, invariably call for more capital, and with such a hazardous business as vegetable growing has been in the past, many have been chary of sinking capital in their businesses. The advent of tariffs on foreign produce has rather altered the position, and it is the duty of all of us engaged in the growing industry to-day to supply the goods where our climate and soil permit, which have in the past come from abroad. There are a few growers who for a number of years have been endeavouring to compete with the foreigners ; some have been successful, others have had to give up, largely because they contracted out for so much of their work such as transports, manure contracts and selling ; consequently, even with the present tariffs, the profits are very small. The old returnable crate which after a few journeys becomes a dirty and untidy package, has got to go, and whether we like it or no, I

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consider we shall all be forced to pack our best grades of vegetables in clean non-returnable crates.

At the Conference we heard a good deal of the mechanization of farms. This may be well on farms extending to 200 acres and over, but the smaller the vegetable farm the more intensive the work and the more hand labour required. We are told to-day to copy the foreigner. One sees very few machines of any sort on Dutch or French vegetable holdings, and this largely accounts for the high grade of their produce. The production of such crops as lettuce, carrots, cauliflowers, turnips, marrows, etc., etc., under glass, whether in cold frames or cloches, can only be done with hand labour and had we more of these holdings in this country, instead of men being driven off the land by machines, we should be continually drawing fresh labour into our villages.

In regard to salad and other crops, the grower to-day must work for the early and late season. For this purpose he must have plenty of lights and cloches. The standard Dutch light which can be purchased in this country to-day at 3s. 10½d., is, in my opinion, the best light to use. The French light is also good : the framework of the French light is made of 2 ins. by 2 ins. timber with three small T irons which act as sash bars. The low barn type of continuous cloche is very quick in its work and is the best of all the continuous cloches. The expenses for repairs on the French light are heavier than the Dutch.

To state briefly, the following methods are those that can be employed in the cultivation of salad, and other crops under glass. The main crops are lettuce, carrots, cauliflowers, turnips, and marrows. The Lettuce are sown in lights fairly thickly from the 10th to 25th October. For cold frame work the best variety is " May Queen " for greenhouse or hot bed " Gotte à forcer " or " Loos Tennis Ball." Sowings are made every three days. As soon as the seedlings are large enough to handle they are transplanted into cold frames 1½ ins. to 2 ins. apart. The soil in these frames must be well prepared and a little well broken down manure spread over the top and forked in. This must not be fresh, but thoroughly well decayed and fairly dry, in fact, almost in the condition of dust. The lights should be kept closed until the seedlings have made fresh root and then should be aired back and front in mild weather, only shutting down in severe frost. If the frost is very severe the lights should be covered with litter or mats.

Cauliflower plants can also be raised by the same methods. These should be sown on the 12th of September and pricked out in the same way as the lettuce. Plenty of air should be given to the plants, the lights being removed on fine days. In both cases the plants must not receive any rain or be watered. As soon as the days begin to lengthen (about the 15th January) permanent beds should be erected. The soil must be in a friable condition containing a fair amount of humus and moisture.

The first crop to be sown in the beds is carrots. These are sown

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broadcast, care being taken to sow thinly. Any good forcing varieties are suitable, such as Demi Long à forcer, etc., etc. The lettuce are then planted 9 ins. to 10 ins. apart and the lights are put on and kept shut down. It is not necessary to air the lights until the lettuce are almost ready to cut. When the lettuce are ready to cut four cauliflowers are planted in each light, two at the top and two at the bottom. As soon as the lettuce are marketed the cauliflowers and carrots will require water and this must be done by overhead irrigation. Water must not be slopped on with a hose pipe. The lights from now on must be given as much air as possible, and as soon as the young cauliflowers begin to touch the glass the lights should be removed. If any form of heat is used turnips also may be sown in the lights. The lights from now on can either be used to erect greenhouses as in Holland, or they can be placed over young marrow plants which have been sown about the 1st February, in this way marrows are obtainable when very high prices rule in the market.

Downy Mildew is the chief disease to watch against in the lettuce beds. Loos Tennis Ball has been found a good variety to withstand this disease, but for hot beds Gotte à forcer is to be recommended. A good variety for cold beds is May Queen.

As a final word in regard to salad produce. It is advisable to work for the early and late seasons, as during the time that small fruit is in, lettuce is usually a glut.

H. HICKMAN (Wisbech).—In the few minutes at my disposal I wish to make some remarks regarding the canning industry from the growers point of view. While not underestimating the influence the canning industry will have on the fruit-grower, we must not lose sight of the fact that as far as fruit is concerned the jam industry takes a far heavier tonnage of the soft fruit. It is of no use to the country to start a fresh industry unless we take steps to preserve one which we have already made, and which during the last few years has been hurt by the importation of fruit in pulp at excessively low prices with which we cannot compete. The combined industries, in both are successfully carried on with English fruit, will have a far reaching effect on the future of British fruit growing.

If canners in a year of plenty can see their way to put down more than their ordinary requirements in anticipating the shortage which the next season invariably brings, they will help the fruit growing industry considerably. With regard to pickles, I have unfortunately lived long enough to remember the time when the whole of the cauliflower and a large portion of the onions used in pickles were grown in England, but now the Dutch and French, with their lower cost of production, and lower standard of living have unfortunately beaten us, but with the tariff in view, we shall hope to regain the business we once had, and we ourselves made.

In conclusion, I regret to hear some of the speakers dwelling so much on mechanization of the industry. We all use tractors but when it comes to the picking of our fruit crops machines are of very

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little use and the great hope for the future prosperity of England is to have a virile agricultural population and it is my earnest hope we shall achieve this in the near future.

MESSRS. SUTTON AND SONS (Reading).—Seed growers have done more than anyone in raising and developing new and improved strains of vegetables.

It has been stated that the only variety of dwarf bean suitable for canning is the Refugee, seed of which is not produced in this country. It may, however, be of interest to state that this variety was offered in our catalogue over fifty years ago, but was discontinued because it was superseded for *culinary purposes* by many better varieties. There were no canning factories in this country to need it in those days.

It is difficult for those who are not constantly working on the raising of new varieties to realise the amount of care and thought which is expended in the process. Potatoes, roses, dahlias and fruit trees are quite in a different category to vegetables, for they are propagated by roots, bulbs, grafts or cuttings, and are really the parent plant perpetuated. Seeds are a new generation, produced by pollination, and whilst generally the progeny of a plant will be like the parental form, there is no certainty that every plant will be identical. Successive generations of a variety often vary from the original, according to the ideas of the seed-grower or person selecting, whilst the tendency to degeneration in all, and the possibility of cross-fertilisation in many, accounts for the variation which is sometimes to be found in crops grown from seed. Seed merchants with a reputation to uphold do their utmost to keep their seed crops as true to type and as perfect as possible, and nothing that they or any other organised body can do with trials or selections will make it possible to guarantee that plants produced by seed will always be 100 per cent. perfect and precisely identical with the parental form.

HARRISON AND SONS (Leicester).—The recent developments in market gardening have extended to farmers whose acquaintance with the varieties and character of vegetables is not extensive. To the farmer now taking up this department, a word of warning may not be out of place: High quality seeds which are a necessity cannot be produced cheaply, nor does it follow that the most expensive will suit his soil, and his purpose. He has therefore much to learn in what is to him a new business, and he should act with the utmost caution and be guided by those of experience—growers and seedsmen alike.

It should be noted that the market requires supplies of well-grown vegetables, even in character, and just at perfection, and for these will pay the best price. For this purpose, special stocks must be selected, so that the crop matures well and evenly, with as few discards as possible. In this respect stocks differ from those preferred by the ordinary private gardener who requires one crop to supply small lots over a long season.

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The production of seeds for the market grower is a specialized one, and is confined to a limited number of seedsmen. It is different from the production of potatoes (except from seed—not sets). Potato reproduction is definitely from the tuber, and cannot be changed by any method. Seeds are the result of fertilization, and in consequence, are liable to great variation of character and strain.

Whilst this gives a very desirable scope for selection, it also makes an enormous number of varieties and names, and because many are selecting according to their own ideas and fancies, as well as the suitability or otherwise of the varying soils and climatic conditions, names have been bestowed all too generously.

There are many more pitfalls in connection with vegetables than with farm roots, and where possible, farmers interested should accept the opportunity of visiting seedsmen's trial grounds in order to select such varieties and strains which are likely to suit his market, as well as his soil and climatic situation.

The best prices are given for crops out of season, but only experience will teach one how safely to get that result. In this endeavour great caution is necessary. The serious seed merchant is just as anxious to supply the best and most suitable article, and he spends much time and money in testing and purifying stocks, as well as trying to produce better ones.

It is acknowledged that the British seed grower and raiser stands as high in the world's estimation as does the live stock breeder.

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