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Growing peas for canning and freezing in Western Australia

James P. Fallon

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GROWING PEAS FOR CANNING AND
in Western Australia

Canned and frozen peas to the total annual value of over a quarter of a million pounds are being imported into Western Australia from Eastern States. Could our requirements be supplied from crops grown in this State? The answer is "Yes" and this article gives a general background of information on pea growing and an indication of areas suitable for pea crops.

By J. P. FALLON, B.Sc. (Agric.), Adviser (Vegetables), Horticultural Division

For many years Western Australia has relied on Eastern States for a large proportion of the canned peas sold in this State. In fact, even in 1960-61, £167,529 worth of canned peas were imported from the Eastern States.

In recent years frozen peas have become very popular with housewives throughout Australia. Unfortunately, Western Australia is also largely dependent on Eastern States production of peas for a continuity of supply of this product. When adverse seasons are encountered in pea growing areas in other States, it is at times necessary to import peas from as far afield as the United States.

The following figures indicate the volume and value of Eastern States peas sold in Western Australia in the past few years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Quantity (lb)</th>
<th>Value (£)</th>
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<tr>
<td>1957/58</td>
<td>187,900</td>
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<td>1958/59</td>
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<tr>
<td>1960/61</td>
<td>1,108,400</td>
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Although some snap freezing peas have been grown in this State in the last two or three years, it is obvious from the above figures that there is room for vast expansion of local production if the State is to become self-sufficient.

Peas for canning or freezing are usually grown under contract to a processing firm. The operations involved in growing and harvesting the crop are highly mechanised. Usually, the crop is sown by the farmer who supplies seed and fertiliser. However, the date of planting is dictated by the processing firm.

Care of the crop during the growing period as regards control of weeds and pests is also the responsibility of the grower.

Harvesting is carried out by the firm, which supplies all harvesting and transporting equipment. A mobile viner is sometimes used and this machine picks up rows of peas which have previously been mown and windrowed by a pea mower and which, while travelling around
the paddock, separates the pods from the vines and shells them. Alternatively, the crop may be mown and windrowed and the vines picked up by a green crop loader and carted to a stationary vining machine.

As each vining machine has only a limited capacity for handling vines, it is necessary to spread the harvesting season over as long a period as possible. Sowing dates for each district must therefore be planned with considerable care. Attention must be paid to temperature and rainfall data for each area as well as soil types, aspect of paddocks and the choice of variety.

It is important that all pods on a crop should reach maturity as near the same time as possible, since wide variations in maturity mean loss in yield. Pea varieties bred for uniform maturity are used for crops intended for mechanical harvest. However, care must be taken also that an even germination is obtained by drilling into a well prepared seedbed, and that the crop does not suffer from pests, diseases or weeds.

Pea growing is risky in that not only is the crop more sensitive to soil and climatic factors than cereals, but also a higher standard of farming is required in the management of pea crops. On the other hand, pea growing can be considerably more profitable than most other types of extensive cropping or farming and hence the greater risk, cost of planting and attention required to produce a satisfactory crop is well repaid.

CLIMATE AND RAINFALL

Peas are sensitive to hot conditions and thrive only in cool weather. As temperature during the growing season rises, the yield rapidly decreases.

The crop is also sensitive to cold injury. Although the plant itself is relatively hardy, damage can occur if a cold snap follows several days of warm weather.

During the flowering stage or when pods have formed, frost can also cause serious damage.

Peas require a fairly high and regular rainfall. Any prolonged period of drought can result in a serious reduction in yield or a crop failure. This is particularly the case if dry conditions causing moisture stress are experienced between flowering and harvest. Growth is influenced more by soil moisture relationships than by any other factor.

Although dry periods can be disastrous, peas are also one of the first crops to suffer from water logging and very wet weather.
Districts suitable for pea growing in Western Australia fall mainly within the area receiving 18 in. to 30 in. annual rainfall. Individual districts within this belt vary considerably in distribution of annual rainfall. The accompanying tabulation shows the average monthly rainfall and percentage probability of monthly rainfall equalling or exceeding 1 in. and 2 in. for most of the districts shown on the map below. The most suitable districts are those receiving from 3½ to 4 in. of rain for each month of the growing period.
CLIMATIC DATA FOR A SELECTION OF AGRICULTURAL AREAS IN WESTERN AUSTRALIA

Line 1.—Average monthly and average annual rainfall, in points (100 points = 1 inch).
Line 2.—Percentage probability of monthly rainfall equalling or exceeding 1 inch.
Line 3.—Percentage probability of monthly rainfall equalling or exceeding 2 inches.

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Altitude and distance from the coast also are important in regard to pea growing, as the higher the altitude the longer the growing season. Cool nights or cool breezes which tend to revive the plants after a hot day are more likely to be experienced at the higher altitudes or near the coast.

Areas suitable for pea growing in Western Australia lie mainly within the 18 in. to 30 in. rainfall belt.

Although winter rainfall in this belt is very reliable, most districts receive considerably more than half their annual rainfall in the four month period from May to August. Many districts in this area are therefore too wet to be ideal for pea growing during the winter months and too dry and hot during September and October.

This type of rainfall distribution and climate prohibits any great spread of production in such areas and limits the acreage that can be satisfactorily handled by any processing firm. It also makes pea growing a risky enterprise as the potential for high yielding crops is not great.

An ideal rainfall pattern for pea growing would be 3½ in. to 4 in. of evenly distributed rainfall each month during the growing period.

The pea mower cuts and windrows vines in the one operation

This ideal is more closely approached in districts towards the south coast (see average monthly rainfall figures—Mount Barker). Distribution of rainfall is more uniform in this area and as the growing season is longer production could be spread over a longer period. Average daily maximum temperatures in the spring and summer months are also lower than in the other agricultural areas further north so that in these areas where satisfactory soil moisture conditions are present, cropping could be extended well into the summer.

SOILS

Although peas will grow satisfactorily under a wide range of soil conditions the ideal soil is a friable well drained loam with high humus content.

Heavy clay soils are not desirable, and unless rainfall conditions are almost perfect, very light land should not be used for pea growing.

Old clover paddocks high in humus are ideal. A high humus content in the soil improves moisture holding capacity should dry conditions be encountered late in the season. Under wet weather conditions as are often experienced at planting time or...
Even on moderately sloping land, erosion can occur following sudden cloudbursts. Damage is likely to be more severe where soil structure is poor and organic matter status low.

shortly after in this State, the humus-rich soil tends also to retain its structure and not run together and cake as badly as one low in humus which has been heavily cropped.

**SELECTION OF PADDOCKS**

In selecting a paddock for pea growing, factors other than soil type and fertility should also be considered.

The area selected must be suited to the operation of the various types of machinery used in the pea growing industry. Steep slopes are unsuitable as mowing and vining machinery cannot be operated successfully, and erosion hazards can be great.

It is important also that the paddock be free of sticks, stumps or rocks which would be likely to seriously damage valuable harvesting equipment.

Good drainage is essential, as the pea plant will not thrive on soggy or water-logged soil. Even water-logging for a few days can be disastrous.

Aspect must also be taken into account as this can influence maturity of the crop. An easterly or north-easterly aspect generally gives an earlier crop than a southerly aspect.

**LAND PREPARATION**

For preference a long turning mould-board plough should be used for initial breaking up. Subsequent cultivations may be carried out with disc machines.

Where ploughing is not carried out until the opening rains are received the paddock should be heavily grazed or burnt off before being broken up to get rid of as much dry grass and fibrous material as possible.

Spring topping of pastures or mowing for hay can be a valuable means of reducing the density of the stand of dry grass on paddocks for pea growing, and of considerable assistance in weed control. Incorporation of a heavy matt of dried feed not only interferes with the preparation of an even seed bed but breakdown of the material in the cool weather conditions at that time of year is slow and could involve depletion of soil nitrogen, with detrimental effects on the growing crop.

For satisfactory weed and pest control, the ground should be left for two weeks after the initial ploughing, before reworking with a disc implement and sowing.

Spring or early summer ploughing, while involving a loss of valuable grazing, allows earlier sowing. This can be an
advantage in areas with a short growing season, particularly in years when the break of season is later than usual.

It is essential that ground preparation should be aimed at producing a seedbed that is as even as possible. It must be remembered, at the time of cultivation, that special pea mowers cutting eight or 10 feet and working at ground level will have to cover the area and any ridging or unevenness will mean loss of peas. Uneven ground also means varying depths of sowing and possibly uneven maturity of the peas at harvest. This increases the difficulty of timing the harvest and may mean loss of yield to the grower.

Thorough preparation of the land will be repaid in easy sowing and a weed free even crop which is easy to mow. Peas are particularly sensitive to poor soil conditions; they cannot thrive where bad drainage or bad soil structure leads to waterlogging and lack of aeration. Although a good clean, level seedbed is desirable, excessive working of the soil leading to breakdown of structure and setting of the surface is dangerous. The aim should be to obtain clean seedbed conditions with as little working as possible.

One mould board ploughing followed by a working with disc harrows usually gives a satisfactory seedbed and good weed control.

**SOWING**

The time of sowing in any particular district varies according to the variety, and the programme of plantings to be carried out in the district by the particular cannery or freezing firm involved. Usually, times of sowings are arranged by the factory to fit in with the programme of production planned for the district, so that harvesting of the crops can be as uncomplicated as possible, with the minimum risk of crops clashing at maturity.

Some processors use a system of planned sowing dates based on the theory that the rate of growth of a crop depends on temperature.

The number of degree hours above 40° F. required to bring a certain variety to maturity in a given area is calculated and recorded each season. The number of degree hours estimated to accumulate during the desired intervals of harvest are then allowed to elapse between plantings. Although in actual fact temperature is not
the only factor affecting growth of a crop, the system serves as a useful guide, particularly when records have been kept for a number of years.

Sowing is carried out by means of a grain seed drill or combine, and usually light trailing harrows are pulled behind the machine for covering and levelling the seedbed.

As the peas are large, special cogs are needed for some machines to enable enough pea seed to be sown.

The depth of sowing of peas varies with the time of seeding. During the cold winter months peas should be sown as shallow as possible—one to 1½ inches covering is sufficient. In later plantings, where moisture becomes limiting near harvest, deeper sowing of up to two or three inches may be advisable. Deep sowing during the winter period can result in seed losses due to decay in cold wet soil, resulting in poor uneven crops.

The rate of seeding for peas sown through a grain drill may vary from two to four bushels an acre, depending on the district, soil fertility and climate.

NODULATION

Inoculation of pea seed with nodulating bacteria is recommended.

Dry peat cultures are available and the cost of the material is about 10s. for each bag of seed (2½ bushels). Early nodulation in peas is desirable as this is the most economical means of making available a supply of nitrogen to the developing crop.

Experience in Western Australia indicates that on well structured organic loam soils good early nodulation is readily achieved if seed has been inoculated. However, on soil types where soil structure is poor or lacking, the plants often fail to nodulate, despite greater than standard rates of inoculation, until the crop is nearing flowering. As a result, such crops are usually lacking in vigour and rarely yield well.

The use of lime super to provide a more favourable environment for the multiplication of nodulating bacteria does not overcome this difficulty. Application of a quick acting source of nitrogen at rates up to 2 cwt. per acre may be an essential in producing high yielding crops under such conditions.

A bank of stationary viners. Vines from the paddock are brought to the viners and fed in without delay.
A mobile viner. This machine picks up the vines which have been previously cut and windrowed and separates and shells the peas while travelling around the paddock.

**SEED PELLETING**

Lime pelleting of pea seed could be a valuable means of assisting nodulation in peas, but trials carried out to date have shown that pelleted seed can not be readily sown through a standard type grain drill. Even where only small quantities of lime have been used trouble has been experienced with stripping of cogs in the drills.

**SEED TREATMENT**

Peas are subject to attack from fungous disorders, particularly in the pre-emergence stage of growth.

For this reason, pea seed is usually dusted with a seed protectant dust. This treatment is often carried out by the seed company from which the seed is purchased.

As most seed protectant dusts are toxic to the bacterial cultures used for inoculating pea seed it is important to select a seed protectant material which is least likely to upset nodulation.

The dust which has been found to be least damaging to nodulating bacteria is sold under the names of Tetroc or Coversan.

The rate of application of dust is 1½ oz. per bushel of seed. Where inoculation of seed is to be carried out, the bacterial culture should be applied to the dusted seed just prior to planting.

**FERTILISERS**

Like all other crops, peas require adequate quantities of nitrogen, phosphate and potash for satisfactory growth and development.

Being a leguminous crop, however, peas can usually obtain their nitrogen requirements through the nodulating bacteria which develop in association with the plant roots.

**Nitrogen:**

On light soil types, particularly where early winter plantings are being made, some trouble may be experienced in getting satisfactory nodulation. Although no detailed experimental work has yet been conducted on fertiliser requirements of peas it is suggested that the use of nitrogen in a quick-acting form such as nitrate of soda or sulphate of ammonia at rates up to 2 cwt. per acre could prove an economic proposition.

Nitrate of soda, although more expensive, has the advantage of being quicker acting in cold wet weather and less likely to add to acid conditions. Where nitrogen fertiliser is used it is essential, if injury is to be avoided from contact with fertiliser, to apply the nitrogen in a separate operation. Broadcasting just before or immediately after sowing would be satisfactory.
Phosphate:
On high grade organic loam soils excellent results have been obtained by the use of basic superphosphate at the rate of 2 cwt. per acre or 50:50 lime and superphosphate at the rate of 3 cwt. per acre.

Potash:
In the limited trials carried out to date no increase in growth of vines or yield has been obtained by the use of potash with superphosphate.
However, where it is planned to use nitrogenous fertilisers at rates of 2 cwt. per acre, ½ cwt. of sulphate of potash could be used, as high rates of nitrogen without potash may cause excessively soft unbalanced growth of vines.

Copper and Zinc:
In areas where copper and zinc deficiencies have been recorded, these elements should be used if not previously applied.

LIMING
Peas will not grow well in very strongly acid soils—pH 5.5 and lower—but the use of lime on extensive areas to be used for pea growing cannot be recommended at the present price of lime. Recommendations made for the use of lime mixed with superphosphate are not aimed primarily at improving pH of acid soils; it is more important to provide a micro environment in the vicinity of pea seed suitable for the multiplication of nodulating bacteria.

HARVESTING, YIELD AND QUALITY
The time to harvest is fairly critical and is determined by the company with whom contracts have been arranged.
The pods should be well filled with tender young peas and just changing in colour to a lighter green. A delay of a day or two results in increased yield but a marked deterioration in quality.
As peas for canning or freezing have not been widely grown in this State, no
figures for average yields an acre from
different districts are available. However,
as a general guide, a good crop of peas
would be expected to yield in the vicinity
of one ton of shelled peas per acre.

Quality is usually associated with tender­ness and high sugar content. Most
processors use a mechanical means of
determining maturity. Toughness of seed
coat and firmness of the flesh of the pea
can be measured in a device known as a
maturometer. Some firms make payments
to growers on the basis of maturometer
readings.

DISEASES AND PESTS
The main disease likely to be encountered
in pea crops grown during winter in this
State is aschochyta blight.

This disease is particularly prevalent
where drainage is impeded and very wet
conditions are encountered. A discussion
of the disorder and its control may be
found in Department of Agriculture Bul­
letin No. 2214.

Red Legged Earth Mite is probably the
most important insect pest affecting pea
crops during the early stages of growth.
This pest is relatively easily controlled by
the use of DDT but as lucerne flea is also
sometimes encountered, it is advisable
when spraying to include malathion in
the spray mixture in order to ensure con­
trol of this pest as well.

The recommended rate of application of
the malathion-DDT mixture is malathion
1 ounce active ingredient (4 tablespoons
of 50 per cent. malathion) plus DDT 1
ounce (¼ pint of 20 per cent. DDT
emulsion) per acre.

ACKNOWLEDGMENTS
The valuable suggestions made by many
officers of the Department of Agriculture
during discussions on various aspects of
pea growing are gratefully acknowledged.
Constructive comments particularly from
Messrs. H. M. Fisher and H. G. Cariss have
been most helpful.

Much of the pioneering work in relation
to operations and techniques involved in
pea growing in this State and resulting in
present recommendations has been carried
out by processing firms, and their work and
the co-operation of their individual officers
is gratefully acknowledged.

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(Department of Agriculture)

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The successful applicants then continue with Sub-Leaving, or higher studies, in 1963.

Before the course can be commenced applicants must have studied:

Junior.—
(a) English; Maths A; Maths B.
(b) Physics and Chemistry (or Science A and Science B), or General Science.
(c) Book-keeping.
(d) Others such as Geography.

Sub-Leaving.—English; Maths A; Physics; Chemistry and others.
Those who take General Science need extra Chemistry and Physics in the following year. Some prefer to take Junior Book-keeping in the same year.

Should places still exist for 1964 commencement after the preliminary selection early in 1963, they are filled in order of application during 1963, by qualified applicants.

Duration of Course.—Two years.
Fees.—Approximately £190 per annum covering full residential charges.
Scholarships.—Department of Agriculture (3), the "Countryman" and J. J. Poynton Memorial (2).

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