

to the prehistoric Jordan Plain Sea. According to their properties they may be divided into two types:

Dry "Solontchak" and wet "Solontchak".

The soluble salts of dry "Solontchak" soil are Chlorides and Sulphates of Ca and Na (see tables p. 134). Soluble salts in wet "Solontchak" are Chlorides and Sulphates of Ca, Mg and Na. K is also present in the soils, its amount increasing with the depth.

Notes on Control of the Vine Moth

(Polychrosis Botrana Schiff.)

by Dr. F. S. Bodenheimer

Polychrosis Botrana Schiff. is the most important insect pest on vines, especially in the mountains. At Kiryath Anavim it appears in three generations yearly, the average damage varying between 20 and 60 %.

Three dustings of Esturmit are recommended as control measure: the first, 10—14 days before, the second during, and the third 14 days after the flowering of the vines.

Demonstration-Fields for Crop Rotation

by S. Zemach, Dr. M. Zevi, and Ing. Agr. H. Zaloszer.

Objects: The purpose of the demonstration fields was to find if it is possible from the very beginning of the settler's taking possession of his land, uncultivated, covered with nettles, impoverished, unameliorated as it is, to attain normal yields by means of chemical fertilizers, improved rotation and the correct method of cultivation. For this purpose we began two demonstration fields for crop rotation in the year 1924, one at Nahalal of 180 dunams, the other at Ain Harod of 140 dunams. These were divided into sections of 10 or 20 dunams each in order as far as possible to approximate to conditions in ordinary farms.

The Demonstration Fields at Nahalal.

1. Quality of the soil and tillage in the first year. This soil was of medium quality, of Nahalal type b. (a. is the best

quality, b. is medium, c. is poorer than medium). Observation shows that the soil is of the typical heavy variety, especially in its upper layer, of which 72% is formed of very small particles (dust and loam). This soil is not rich in lime (only 5-6%), which without doubt causes its stickiness. It is not too poor in nutritive substances.

2. *The Crop Rotations*: We began the following three crop rotations:

A. Three-year rotation. Vetch-hay, maize, wheat.

B. Four-year rotation. Cultivated fallow, wheat, maize, oats or barley.

C. Four-year rotation. Widely placed and cultivated wheat, widely placed and cultivated flax, maize, hay.

Summary of Results: We have really only to compare rotation A with rotation B. Rotation C, widely-placed and cultivated wheat, does not enter into comparison, because of the radical change introduced. Nevertheless we append the average yield of the crops of all three rotations in order to show that it is not the rotation itself which is the deciding factor in the yields, but that the important factors are other, such as good cultivation and chemical fertilizing.

Average Yield for the Three Rotations, in Kgs. per dunam

Rotation	Wheat	Maize	Vetch for Hay	Flax	Barley and Oats
A	139	187	334	—	—
B	134	169	—	—	135
C	108	176	395	82	—

The figures show that for the main crops there are no great differences between the different rotations. Rotation C however shows unfavourably in its wheat yield, the average of which is below that in rotations A and B — about 30 kilograms less per dunam in spite of the fact that it received a larger quantity of chemical fertilizer. The real reason for this can only lie in the wider spaces, which reduced the yield. This reduction came in particular in a good year when the rains were plentiful and in the right time. The usual closely-sown

field takes advantage of these conditions to the utmost, showing a wheat yield of about 200 kgs. per dunam, whereas cultivated wheat cannot reach such a high level.

The maize yield is practically the same for all three rotations. The apparent higher yield in rotation A must be viewed in conjunction with the fact that the 1926-27 figures for rotations B and C are missing, the maize having been stolen from the fields before the gathering. That very year the maize harvests were bountiful, as is shown by the yield in rotation A field b. which attained the maximum for all the fields during the entire period - 229 kgs. per dunam.

Basing ourselves on all the results shown in the attached tables, we arrive at the following conclusions:

A. The Rotation. We see the advantage of a rational crop rotation, that is so to say, the preparation of a good catch crop for the cereal which follows, the division of the grain fields into sections with ordered alternations, so that the farmer always knows the crops which have to be sown and prepares for them beforehand, and avoids casualness and negligence in working his fields. These are the main factors in a fixed crop rotation which lead to increased yields. We find the type of rotation to be only a secondary factor.

The demonstration fields at Nahalal showed us that yields of wheat and maize were not higher in rotation A than in rotation B. Increased yields in either of the rotations depend on the thoroughness with which the field is prepared.

In the Nahalal district there is no necessity to include a field of cultivated fallow in the rotation. In most cases a good maize fallow does not fall below cultivated fallow in its yield.

In rotation C, wheat without cultivation, following on maize, in 1927-28 gave 170 kgs, per dun., following on vetch for hay, 170 kgs. per dunam. In 1928-29 the wheat field following on maize gave 148 kgs. per dunam.

In 1927-28 the field in rotation A gave 200 kgs. wheat; in rotation B, 140 kgs. In 1928-29 wheat in rotation A gave 161 kgs, per dunam, and in rotation B, 164 kgs. per dunam.

It is understandable and inevitable that there should be a difference in favour of these two rotations (A and B) for in the

first wheat comes after two catch crops, and in the second after cultivated fallow, although the difference is small and there is no purpose in leaving the field fallow for a whole year, which results in large loss in grain, especially in this zone where maize attains very high yields and leaves behind a good fallow for wheat.

Rotation A — vetch first, followed by maize, then by wheat, undoubtedly raises the wheat and maize yields, and ensures their normal, average size. It has, however, two disadvantages. Firstly, the field of vetch for hay, which takes one-third of the fields and is the first green in the district, is here exceptionally liable to attack by mice, which very often decrease the vetch yields, besides being easily liable to spread themselves into the wheat field during the harvest time. In 1925-26 Nahalal suffered severely from mice; it is not by chance that the yield in rotation A fell to 85 kgs. per dunam; in rotation B it reached 113 kgs. and in rotation C cultivated wheat, 109 kgs. per dunam. Secondly, this rotation results in heavy loss in straw. Taking the wheat field in the farm as 30 dunams (3 ha), and the average yield as 140 kgs. grain per dunam per year, then the farm produces a maximum of 8 tons of straw. And if it is desired to include a little flax, which is advisable when prices of grain seeds fluctuate, then the quantity of straw will be still further reduced. Such a farm, which has 8 head of cattle in its stables and cowsheds besides 80 chickens, requires at least 15 tons of straw for food and litter. It is possible for 30 dunams of maize to a certain extent to make up the difference, but even so there will remain a deficiency of 6 tons of straw.

There still remains the question as to whether it is possible to devote a third of the fields to vetch for hay, which is not easy to grow. And it appears that this rotation should not be applied in all the grain area of the farm but should be confined to the fields close to the house. For the remainder of the fields it is more rational to adopt a four-year rotation in which catch crop and grain alternate.

B. Chemical Fertilizing. 1. There is no necessity at all for chemical fertilizer in the maize fields.

2. Frequent chemical fertilizing in small quantities for all

crops (except maize for grain) each year is the surest way to increase yields and retain them at a normal economic level. For the conditions in Nahalal and district the fertilizer should contain only phosphorus and nitrogen, and for the first two years, immediately on taking possession of the land, it should be kept at a strength of 15 kgs. double superphosphate per dunam and 10 kgs. ammonia or nitrate of soda. Thereafter, in accordance with the soil conditions of course, the amount of fertilizer may be reduced to 10 kgs. double superphosphate, 5-7.5 kgs. ammonia to be given at time of sowing with additional fertilizer during growth.

This factor of frequent fertilizing in small quantities is among the first and most important in freeing the farm from extreme and chance variations in yields, which latter are never of any advantage.

C. Methods of Work. a. The working methods applied in the demonstration fields at Nahalal were in every respect the same as are usual on ordinary farms, with all their defects. It was evident that there is no necessity for summer ploughing after the grain. Furrowing (with the Arab plough) immediately after the first rain, definitely suffices as the first ploughing for maize.

If we compare field A-1 in 1928-29 (ploughed by tractor in November, by plough in March, and by 2-shared plough in April; in May the seeding was done by buckler (combined drill-plough only because the upper earth had dried) with field C-2 in the same year (furrowed in December, and ploughed with the 2-shared plough in March, and seeded with the drill machine) we get 149 kgs. per dunam for the former and 162 kgs. for the latter. Secondly, if we compare field A-1 in 1925-26 (which received ploughing in summer after harvesting the vetch, 2 discuses in November, twice ploughing by 2-shared plough in March and once in April) with field D-2 in the same year (furrowed after the first rains with the Arab 2-shared plough — beginning of February — with repeated ploughing by the 2 shared plough — as above-mentioned in March) we get 170 kgs. maize in the former and 195 kgs. in the latter. So that

as regards position in the rotation, the field in rotation A in which maize follows after vetch has the advantage over the field in rotation B where maize comes after the grain.

The main reason for this is that the furrowing reduces the flooding to a minimum, retains the water collected on the surface during the heavy rains, does not entail the many ploughings which turn up the soil in spring and decrease its moisture. We therefore find that in order to prepare the maize fallow there is no need to plough the grain field which precedes it by close summer ploughing: but we must furrow it (by Arab plough) either at the end of summer or immediately after the first rain, the ploughing which follows depending on the weather and the condition of the field.

D. Varieties of Wheat. In these fields we have sown the J'iljilieh, Aujah, and Nursi varieties, and come to the conclusion that the first two should be abandoned, and the Noursi chosen as the variety most suited to this district.

E. General Average of Yield. The general average of all the yields during the 5 years was:

16	fields of maize	177	kgs. per dunam	
8	" " vetch	354	" " "	dry hay
16*)	" " wheat	136	" " "	
5	" " oats	135	" " "	

These yields (apart from those of the oats, which are not worth growing until the right variety is determined) when considered in connection with the facts that in 1924-25 we began work on neglected, uncultivated soil, covered with nettles, which weeds we had to cut down with the reaping machine, and that conditions of work were definitely, in every respect, those of ordinary farming, these yields enable us to declare that they are within the bounds of sound economics for grain-growing, for the following three fundamental factors: a. regular crop rotation, b. good preparation of fields for crop growing, c. manuring albeit limited, by frequent chemical fertilizing.

*) Included in this average there are also 3 fields of cultivated wheat which gave on an average 107 kgs. If we deduct this and take only the average of 13 fields closely seeded we get an average of 142 kgs.

The Demonstration-Fields at Ain-Harod.

The same conclusions arrived at from our analysis in the demonstration fields at Nahalal hold good here too. One factor, however, peculiar to this neighbourhood, stands out above all the other factors, and that is the dry years which cause complete or partial drought, and which influence the general average for any given period. The results force us to the conclusion that the main point lies in the special climatic conditions. Our objects in organising the demonstration fields were here extended to discover in how far there is truth in the opinion, widely held among the agriculturists, that there is no hope for grain-growing in this district without irrigation.

Crop Rotations. We began in Ain Harod with two rotations only: A, a three year rotation, beginning with vetch for hay, followed by maize, finally by wheat; B, a four-year rotation, with cultivated fallow followed by grain, then maize, then again grain. Results are summarised in the tables.

We encountered great difficulty in the problem of the rotation, from three causes. 1. For climatic reasons maize does not reach, nor is there any hope that it ever will reach, the same height as at Nahalal; it is mostly about 50% lower, for we find here the limits of the geographical distribution of maize on unirrigated soil. 2. We proved that in years of drought cultivated fallow is unable to improve the yield, while in rainy years the yield after cultivated fallow is no greater than that after maize or some other good catch crop. In other words the grain harvests in this district depend essentially on the rainfall during the year of growth, not on the amount of moisture collected in the preceding year. A year of drought affected the two fields — after maize catch crop and cultivated fallow — practically in equal measure (in 1927-28 the wheat yield for the first field was 23.1 kgs. per dunam, and in the second 30.2 kgs.). 3. Yield of vetch was low for all years. Moreover in these places hay is grown on irrigated soil (clover, and in the near future alfalfa also) and of course we cannot consider a rotation in which a third of the fields are sown to vetch for hay, or some other hay.

We therefore arrive at the same conclusion as we found

in the demonstration field at Nahalal, though here for different reasons: Rotation A is good. It always showed a greater yield of wheat than rotation B: The average for wheat during five years was 111 kgs. per dunam in rotation A whereas the average for rotation B was only 99 kgs. per dunam. This rotation might with advantage be adopted in the grain farm. We very much regret, however, that its area has been greatly diminished, for it is not suitable for the requirements or the extent of this farm.

Rotation B, with cultivated fallow, is of no advantage. In a year of drought it does not save the fields, nor is its value so clear in a rainy year that we can afford to dispense with a year of full growth. It would not be at all bad to introduce into this district a two-year rotation with alternation of catch crop and grain, so long as the other essentials, cultivation and manuring, are carried out in a rational manner and in due time.

We have thus here, too, come to the same conclusion, that it is not the quality of the rotation which is the chief factor in increased yields, but the application of a rational crop rotation which will keep both the fields and the crops in a definite order, so that the farmer can arrange his work beforehand for purposes which are clear before him.

Flax in Palestine in the year 1928—29

by S. Zemach

A. Area and Yields. — In 1928, after experiments carried out at the Experimental Station by Dr. Pinner and M. Elazari, by Mr. Hazanoff of the Pica, by the writer at Mikveh-Israel, and after the demonstration fields begun some years ago at Gevah, Nahalal and Beth-Alpha, we transferred flax-growing to large fields. In the Zionist Organisation farms alone a total area of over 2,200 dunams at 25 points in all sections of the country was sown, in the Jordan Valley, Vale of Nuris, Nahalal district and Afule district. The Pica sowed 900 dunams of flax; private persons 1,600 dunams. The total area for the whole country was 5,000 dns.

The variation in yield was great. The results before us of

17 fields show an initial minimum yield of 60 kgs. per dunam, finishing at 150 kgs. per dunam. In particular the high yields of the Jordan Valley are noticeable. If we exclude Daganian A from the total (at that settlement the flax was affected by some occurrence which cannot be regarded as normal) then the average for the Jordan Valley (Daganian B, Beth-Zera, Kinnereth) is 120 kgs. per dunam, whereas that for Nuris Vale and Esdraelon is 84 kgs. per dunam.

B. Varieties of Flax. The main variety sown was the Cyprus. Owing to shortage in this seed, however, the Shemen Company distributed the Anatolian variety to farms in Merhavia, Tel-Adashim and Balfouria, while in Kfar Jehoshua all the fields, covering an area of 500 dunams, were sown with this variety.

The Cyprus variety, which excels in its early ripening, the large size of its seeds and its high oil content, is the most suited to local conditions, especially in those zones where rainfall is low. The importance of this variety to the Jordan Valley, Vale of Nuris and Afule district, is beyond question.

The Anatolian variety ripens late, its seed is small (the weight of 1,000 seeds of the Cyprus variety distributed for sowing was 10.35 grams whereas that of the Anatolian was 7.86 grams), and there is no doubt of its unsuitability for this country.

The "common" variety is sown at the Experimental Station at Gevath in the fields of the Division of Plant Breeding and Variety Testing (see "Yedeoth" Nos. 9 & 10, "Oil Crop Experiments" by Dr. Pinner and A. Malzeff). The yield of this variety was found there to be greater than that of the Cyprus, but its ripening occurred later. There is no doubt that the common variety can be used in the valley between the Carmel Hills, as well as in other places with a high rainfall. Its seeds are large and resemble those of the Cyprus variety. In dry years however, the Cyprus will everywhere grow better than the common.

Oil content. The oil content of the linseeds obtained from the local crop not only did not fall below that of the seeds from Cyprus which we received last year for sowing, but even exceeded the latter by 2%—4%. We therefore had no need this year to import seeds for 1929—30 and were able to rely on the seeds of our own farms.

An average sample of flax of the 1928—29 crop was sent to the Empire Marketing Board, through whom we received from the Director of the Imperial Institute, London, a detailed report on the value of the Palestine linseed, which is set out in full:

Imperial Institute
London

Dear Sir,

With reference to your letter of the 29th December last to the Empire Marketing Board, I have to inform you that the letter was passed by the Board to the Imperial Institute, together with the samples of linseed and flax which you forwarded for examination.

I now enclose reports on the products, from which it will be seen that the linseed is of good marketable quality, but that the flax represented by the samples submitted would be of low commercial value in this country, probably owing to the fact that the crop was primarily grown for the production of linseed.

As indicated in the report, the present seed would be classed commercially with Morocco linseed and is currently about £ 17 per ton in London. It is thus of rather higher value than La Plata linseed, which it at present quoted at £ 15. 17s. 6d per ton. The trend of linseed prices in recent years may be illustrated by the following figures for La Plata seed in 1924—29:

Year	Range of Prices per Ton in London	
1924	£ 16. 13s. 6d.	to £ 22. 17s. 0d.
1925	£ 17. 16s. 6d.	to £ 22. 12s. 0d.
1926	£ 14. 7s. 0d.	to £ 16. 16s. 0d.
1927	£ 14. 19s. 0d.	to £ 16. 10s. 0d.
1928	£ 15. 14s. 0d.	to £ 16. 7s. 0d.
1929	£ 15. 13s. 0d.	to £ 22. 13s. 0d.

Regarding your enquiry as to the minimum quantities which should be shipped to this market, in the case of supplies of oilseeds from new sources it is usually desirable to offer at least 50 tons at a time, but if this is not practicable in the present case smaller trial shipments might be made and could no doubt be disposed of.

The Imperial Institute will be glad to be of further assistance, if desired, in connection with the development of your enterprise.

I am,
Yours faithfully,
Lt.-Gen. Sir William Furse.

Linseed from Palestine

The sample of linseed which is the subject of this report was forwarded to the Imperial Institute by the Empire Marketing Board, which had received it from Mr. S. Zemach of the Agricultural Experiment Station, Tel-Aviv, with his letter of the 29th December 1929.

The seed was stated to represent an average sample of linseed obtained in 1929 from the growing of common and Cyprian varieties of flax to the extent of about 2,000 acres in the field rotation of the Jewish settlements, and it was desired to ascertain its quality and commercial value.

Description

The sample weighed 5½ lbs. and consisted of brown, rather flat linseed, in good clean condition but lacking in plumpness.

Results of Examination

The seeds were found to contain:

	per cent
Moisture	7.3
Oil in seeds as received	39.7
Oil expressed on moisture-free seeds	42.8

The oil was found to have the following constants, which are shown in comparison with the figures recorded for linseed oil.

	Present	Recorded Figures
Specific Gravity at 15° C	0.9336	0.931–0.938
Refractive Index at 40° C	1.4740	1.4732–1.4778
Acid Value	0.8	less than 10
Saponification Value	190.3	189–195
Iodine Value (wijs: 3hrs.) per cent	186.5	175–200
Unsaponifiable Matter, per cent	0.8	0.8–2.0

The foregoing results show that the present seeds contained a normal percentage of oil, the figures for commercial linseed usually ranging from 36 to 40 per cent. The oil as extracted with light petrol was golden-yellow and of normal appearance, and from the constants shown in the table it had the usual characters of linseed oil.

Commercial Value

The linseed was submitted to the Secretary of the Incorporated Oil Seed Association, who described it as similar in character and oil content to Marocco linseed as sold on the Association's form of contract No. 35 (a copy of which is sent with this report) and considered that its current price would be about £ 17 per ton in London (March, 1930).

Remarks

The results show that the linseed is of good quality and that shipments of similar seed would be readily saleable in London.

29 March, 1930

Value of the flax fibre. A year ago the Shemen Company brought over from Cyprus two Greek experts in the manufacture of flax for the purpose of finding how far the fibre can be used for textiles.

Samples of the worked fibres were sent to the Imperial Institute, and in the following the report received from the Institute is given:

Report on Flax from Palestine

The two samples of flax which are the subject of this report were forwarded to the Empire Marketing Board by Mr. S. Zemach of the Agricultural Experiment Station, Tel Aviv, with letter of the 29th December 1929, and were transferred by the Board to the Imperial Institute for investigation.

The samples were stated to represent crops obtained in 1929 from about 2,000 acres of flax grown in the field rotation of the Jewish Settlements. They consisted of two varieties, viz. "common" (grown from seed obtained from Messrs. Vilmorin—Andrieux et Cie) and "Cyprian" which were pulled by hand and

retted in the Jordan and the Ain-Harod water respectively. It was desired to ascertain their quality and commercial value and the purposes for which such fibre could be used.

Commercial Value

The samples were submitted to a firm of merchants in London (Messrs. Wigglesworth and Co, Ltd.) who furnished the following report:

No. 1. Gevath. Short flax, varying in length, about two feet long; coarse fibre; evidently sown too thinly; lacking in essential oil; colour bright; strength poor; spinning quality lacking; cleaning very badly done, probably on account of the retting in flowing water, bacterial action not being encouraged. The quality, growth and preparation of this flax are far from satisfactory, and we would not encourage continuing this experiment. With the present abundant supplies of all kinds of Russian flax it would be difficult to find a market for this material at anything over about £ 20 per ton.

No. 2. Geva. This is worse than sample No. 1; about 15/16 inches; little or no strength; brittle; only half scutched and in place not scutched at all. This material would be totally unmerchantable for spinning as line, and in the present market would only be worth £ 12/15 per ton. We express the doubt whether it is expedient to encourage Palestine in the cultivation of flax, as we judge that the class of soil and other conditions are not suitable, but more information would be required before giving an authoritative opinion on this subject.

Remarks

The results of examination show that the present sample of Gevath flax was superior in every respect to the Cyprian (Geva) sample. The former fibre was short, rather coarse, and somewhat harsh, but it was on the whole fairly well prepared, although the scutching had not been thoroughly carried out. The Cyprian sample was much less satisfactory, being still shorter, appreciable harsher, weaker, and darker in colour, and not so well cleaned and prepared.

The inferiority of these samples appears to be largely due to the fact that the crop was primarily grown for the production

of linseed. Although in certain circumstances it is possible to obtain some linseed of satisfactory quality from a crop grown for fibre, it is not feasible to obtain good long flax from a linseed crop. Flax can only be grown successfully by sowing the seed thickly, whereas to produce large crops of linseed it is necessary that seed should be sown sparsely.

Results of hatching and rearing chicks in 1928-29

by David Uri

The farms hatched 85.35% artificially and 14.65% by natural means. The Kvuzoth hatched 100% artificially and the Moshavim 78.36% artificially and 21.64% by natural means.

The total average fertility was 90%.

The record of hatching for all the eggs totalled: 68% from incubators, 73% from hens, 72% from turkeys. Mortality among the chicks up to 10 weeks was: average for all farms 10.2%, Kvuzoth 9%, Moshavim 9.7%.

Sunflower Experiments

by Dr. L. Pinner and Agr. A. Malzeff

Division of Plant Breeding and Variety Testing.

Sunflower varieties were tested at Ben Shemen from 1922 to 1925. The results are given in Table I (p. 177). The local large seeded variety gave the best results. By head-to-row testing 3 strains (Nos. 1, 9, 15) were selected out of the local variety. Selection resulted in the discarding of the many-headed plants and in the lengthening of the growing period; this nevertheless did not lessen its powers of drought-resistance. Oil-content was well inherited.

A new variety trial was started at Gevath, the local strains being compared with Russian small-seeded oil varieties. Table III (p. 180) gives the results of season 1929.

Earlier sowing produced higher oil-content, soil moisture being the main factor in this respect. The grain yield was considerably lower after wheat than after grain vetches. The local large-seeded strains produced higher grain yields than