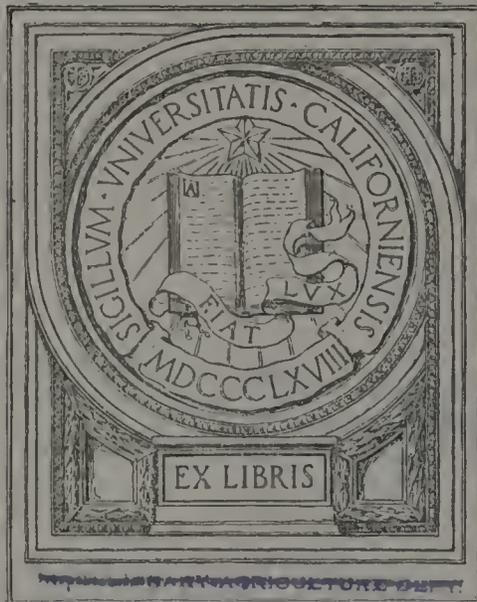


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Bulletin No. 12.

(FIELD CROPS.)

EXPERIMENT WITH FLAX GROWING
AT THE GOVERNMENT FARM AT GUEMMEIZA,

BY

GERALD C. DUDGEON, F.E.S.,

CONSULTING AGRICULTURIST, ETC.

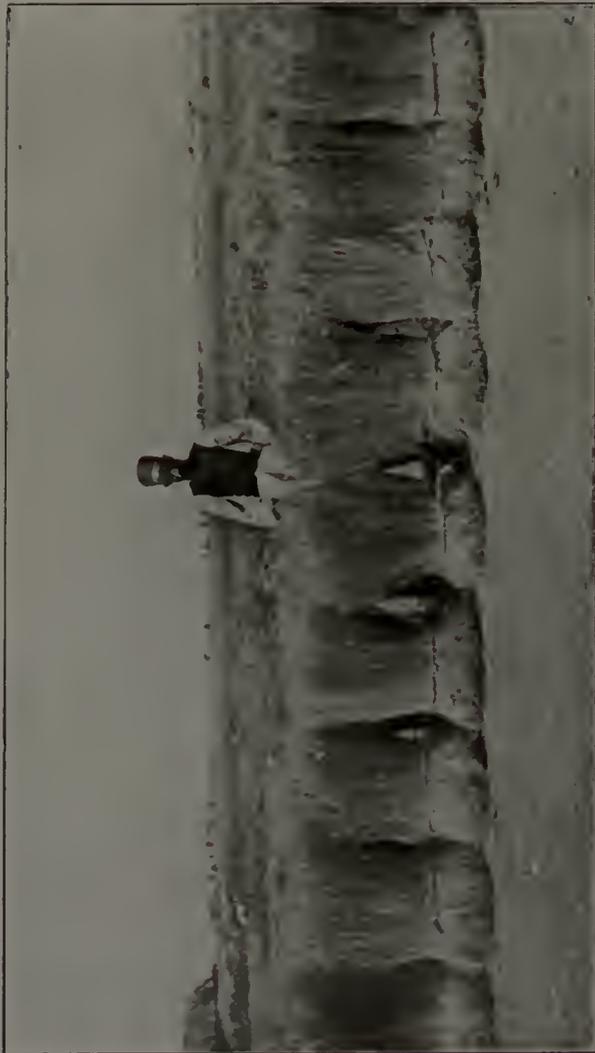
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CROP OF FLAX BEFORE RETTING GROWN AT GUEMMEIZA EXPERIMENT FARM, 1916.

MINISTRY OF AGRICULTURE, EGYPT.

Bulletin No. 12.

(FIELD CROPS.)

EXPERIMENT WITH FLAX GROWING
AT THE GOVERNMENT FARM AT GUEMMEIZA.

The chief sources of the supply of flax to England and France having been cut off by the European war, the price of this product has been so enhanced that it appears worthy of consideration whether in some parts of Egypt it might not prove a profitable venture to plant the crop on a more extensive scale than has been adopted since the establishment of a specialized cotton taught the cultivator to consider the last-named fibre crop the main source of wealth. Previous to the cultivation of cotton on a commercial scale, flax was an important crop, and many looms were found in different parts of Egypt entirely devoted to the weaving of it.* The cultivation of the plant has now almost completely died out, as the figures of the last few years' areas show:—

1912-1913=1,592 feddâns.	1914-1915= 866 feddâns.
1913-1914= 906 „	1915-1916=1,418 „

Whether the deleterious effect of flax-growing upon the soil, which is complained of in some of the northern countries, is felt in Egypt, it has been difficult to definitely determine. Habitual flax-growers in this country maintain that there is no deterioration, and it

* Refer. BREASTED, *A History of Egypt*, p. 96 (1905); GIRARD, *Description de l'Égypte*, XVII, p. 213 *et seq.* (1821). etc., etc.

may well be that, upon the rich soils of Egypt, a crop of flax does not exert such a severe influence as would be experienced in other localities where less fertile conditions exist.

In view of the high price of flax, and doubtless to a great extent to the advocacy of flax-growing by an association of growers interested with the provision of the fibre to the French markets, the area under the crop almost doubled itself in the last year, and it is probable that a further extension will be made in the coming winter. The group of growers above referred to have introduced a plant, the seed of which is said to have been obtained from Ireland, which possesses a longer stem than that which has been cultivated in Egypt from the earliest times. This plant has apparently given good results, although no particulars regarding it have yet been obtainable.

The experiments conducted during 1915–1916 at the Government Farm at Gnemmeiza were undertaken with Egyptian seed only, and the primary object was to determine what rate of sowing would produce the best results, both with reference to seed (linseed) and flax; the method employed in the country being that for obtaining a yield of both together. To this end an evenly conditioned piece of land was prepared measuring one feddân (1·038 acres), and was cut up into three sections, marked I, II, III in the plan given below. The first of these sections was to be sown at the rate of 5 kêlas per feddân, the second at $6\frac{1}{2}$ kêlas, and the third at 8 kêlas. A modification of the original scheme was suggested by Mr. Hughes, the Chemist of the Ministry of Agriculture, and was adopted. According to this, each of the sections was subdivided into three plots, shown as A, B, and C, in the plan, all of the A plots being harvested before the seed had formed completely in order that a better fibre might be obtained, though sacrificing the seed crop; those shown as the B plots were harvested later with a view to obtaining the maximum results with respect to both fibre and seed; and those marked C still later with the seed crop mainly in view. Thus, instead of three experiments as originally proposed, nine equal plots were dealt with, each presenting a different method of treatment.

The whole area was uniformly manured with a dressing of 16 cubic metres of farmyard manure and 90 kilos. of nitrate before the first watering.

All the plots were sown on November 19, 1915, and were harvested on the following dates :—

	Time occupied by Crop.
I A, II A, and III A — March 10... ..	112 days.
I B, II B, and III B — April 2... ..	135 days.
I C, II C, and III C — April 7... ..	140 days.

Arrangement of plots and sections :—

	A	B	C
	Harvested for Stalks only, March 19, 1916.	Harvested for Stalks and Seed, April 2, 1916.	Harvested for Seed and Stalks, April 7, 1916.
Sown at 5 kēlas per feddān. I. 8 qirāts.	$2\frac{2}{3}$ qirāts. Crop of stalks = 518 rotls. No seed.	$2\frac{2}{3}$ qirāts. Crop of stalks = 396 rotls. Crop of seed = 180 rotls.	$2\frac{2}{3}$ qirāts. Crop of stalks = 354 rotls. Crop of seed = 170 rotls.
Sown at $6\frac{1}{2}$ kēlas per feddān. II. 8 qirāts.	$2\frac{2}{3}$ qirāts. Crop of stalks = 397 rotls. No seed.	$2\frac{2}{3}$ qirāts. Crop of stalks = 430 rotls. Crop of seed = 175 rotls.	$2\frac{2}{3}$ qirāts. Crop of stalks = 422 rotls. Crop of seed = 176 rotls.
Sown at 8 kēlas per feddān. III. 8 qirāts.	$2\frac{2}{3}$ qirāts. Crop of stalks = 445 rotls. No seed.	$2\frac{2}{3}$ qirāts. Crop of stalks = 404 rotls. Crop of seed = 154½ rotls.	$2\frac{2}{3}$ qirāts. Crop of stalks = 475½ rotls. Crop of seed = 176½ rotls.

It should be mentioned, with regard to the crops of stalks shown in each of the plots on the plan, that very little reliance can be placed upon the figures given, as any slight delay occasioned during the weighing of any lot might easily affect the result to the extent of the differences shown.

After weighing the green stalks, they were placed in a retting pit and left for from eight to ten days, following which they were thoroughly dried and again weighed. Mr. Hughes has dealt with the results obtained in a report which he supplied to me, and the details of weights, analyses, and valuations, are quoted here *in extenso* from the same.

The first three plots were harvested on March 10, and yielded as follows (the following is taken from the report supplied by Mr. Hughes, modified only with respect to the numbering of the sections to correspond with the plan given above):—

Plot.	Seed per Feddán.	Retted per Plot.	Stalks per Feddán.	Fibre per Cent.
	Kélas.	Rotls.	Rotls.	
I A	5	314	2,826	8
II A	6½	310	2,790	9
III A	8	315	2,835	12

“The proportion of fibre was determined by hand-scutching and combing. It is possible that the results are somewhat higher than would be obtained from the material in bulk. As, however, all the determinations were made by the same individual in the same manner, they should be strictly comparable.

“A number of the dry stems from each plot were measured to ascertain what difference in diameter, if any, was caused by the variation in the amount of seed employed. Twenty-five stems were measured from each plot:—

Diameter.				
Sowing.	Maximum.	Minimum.	Mean.	Length.
Kélas.			Millimetres.	Centimetres.
5	1.82	1.12	1.48	70
6½	2.03	0.75	1.26	70
8	1.77	0.66	0.95	60

“This difference in the size of the stalks was quite noticeable in the growing crop. The stems of the thickly sown plot were unbranched. It was observed that the fibre from these thickly sown plots was also lighter in colour and softer to the touch than that from the other plots.

“The seed from the early harvested plots was so immature as to be of no value. Taking the value of the fibre as P.T. 6 per oke, the

value of the produce from the early harvested plots works out as follows :—

Plot.	Kêlas Seed.	P.T.
I A	5	489
II A	6½	542
III A	8	737

“The additional seed is amply repaid in the crop, but the total return is not satisfactory.

“The second set of plots was harvested on April 2. By this time the seed was fully developed, but not quite ripe.

Plot.	Sowing.	Rotted Stalks.	Fibre per Cent.	Seed.
		Rotls.		Rotls.
I B	5	318	14	180
II B	6½	338	13·3	174
III B	8	350	17	154½

“Calculating the yield per feddân, we obtain the following on the basis of the above :—

Plot.	Sowing. Kêlas per Feddân.	Fibre. Rotls per Feddân.	Seed. Ardebs per Feddân.
I B	5	401	5·89
II B	6½	404	5·72
III B	8	535	5·06

“Taking the fibre as worth P.T. 6 per oke, and the seed at P.T. 285 per ardeb (Monthly Crop Report—April), we find the following gross returns for the different plots :—

Plot.	Value of Fibre.	Value of Seed.	Total.
	P.T.	P.T.	P.T.
I B	868	1,678	2,546
II B	875	1,630	2,505
III B	1,159	1,443	2,602

“It will be noticed that there is very little difference between the first two plots; in the plot sown with 8 kēlas (III B) there is a falling off in the amount of seed, but a very considerable increase in the yield of fibre.

“The remaining third of each section was harvested on April 7. The seed was then quite ripe, and shelled easily. The results were similar to the above, except that there was a larger proportion of fibre.

Plot.	Sowing. Kēlas per Feddân.	Retted Stalks. Rotls per Plot.	Fibre per Cent.	Seed. Rotls. per Plot.
I C	5	263	17	170
II C	6½	374	16	176
III C	8	372	19	176

“Calculating the yield per feddân, we find on the basis of the last figures :—

Plots.	Sowing. Kēlas per Feddân.	Fibre. Rotls per Feddân.	Seed. Ardebs per Feddân.
I C	5	403	5·58
II C	6½	540	5·77
III C	8	636	5·78

“Taking the same values for the produce as were adopted above, we get as gross return per feddân :—

Plots.	Value of Fibre.	Value of Seed.	Total.
	P.T.	P.T.	P.T.
I C	872	1,590	2,462
II C	1,168	1,640	2,808
III C	1,378	1,645	3,023

“The seed from all the plots was very similar, the weight per ardeb varying only from 275 to 278 rotls.

“It will be noticed that in every case the stalks from the most thickly sown plot have contained the largest proportion of fibre. The plots sown with 5 and 6½ kēlas of seed show no significant difference.

From the above figures, it certainly appears that the 8-kêla sowing is to be recommended. In every case the increased produce much more than compensated for the additional outlay in seed.

“As regards the quality of the fibre, the time of pulling appeared to have little effect. In every case, however, it was noticed that the fibre from the most thickly sown plot was lighter in colour and softer to the touch than that from the other plots.

“The seed obtained from the various plots in the two later harvests was examined as to oil content with the following results (petroleum ether was used as solvent) :—

Plots.	Harvested April 2.		Plots.	Harvested April 7.	
	Sowing.	Oil per Cent.		Sowing.	Oil per Cent.
	Kêlas.			Kêlas.	
I B	5	34.5	I C	5	35.4
II B	6½	34.9	II C	6½	36.0
III B	8	36.1	III C	8	35.8

“There is thus no great difference in the oil content. This is in accordance with the results obtained by Eyre and Fisher* in England.

“They found that during the last twenty-two days the oil content only increased by 2.5 per cent. It is therefore not surprising that no considerable increase was found in the seed from Guenmeiza where the interval was only five days.

“It would appear that in England much less seed was employed for sowing. In Eyre and Fisher’s experiment, 1 cwt. per acre, or roughly 5 kêlas per feddân, was considered as “thick” sowing, while their “thin” sowing was at the rate of only 70 lbs. per acre, or approximately 3 kêlas per feddân. Possibly this difference is due to climate or to the fact that a larger variety of flax was used.

“The oil content of the different varieties of flax varies considerably, and it is pointed out in the above-mentioned papers that it is essential for both growers and buyers to realize that the value of the seed depends on the oil content, and on that only. The farmer who grows linseed must understand that he is really growing oil, and must select his seed with this object in view.

* “Journal of Agricultural Science,” Vol. VII, p. 129 *et seq.*

“The idea that good fibre can only be obtained by harvesting the crop before the seed is ripe does not appear to have much foundation in fact ; judging from the above results the best return is obtained in the later harvest.

“At the present time linseed oil is in great demand, and there seems every prospect of this demand continuing. It will therefore be well worth while to make further experiments with this crop, more particularly with some of the varieties which are known to give a large yield of oil. Morocco, Plate, Russian, and Indian varieties frequently give 40 per cent and more of oil. These should certainly be tried in this country.”

In addition to the valuations for the cleaned fibre, given by Mr. Hughes, it may be of interest to cultivators and others to examine the results obtained from these experiments as a whole where the stalks are sold in an unscutched condition, such as is most frequently done in the country. As a matter of fact an offer of P.T. 60 per qantâr, delivered at Benha, was made for the unscutched crop from the whole area, though it was not accepted. This then can be taken as a basis of the price of the retted stalks in the present year, and the price of the seed may readily be assumed to be P.T. 290, which figure at the present moment it actually exceeds.*

The sections each yielded as under in rotls of retted stalks :—

I	=	896	rotls.
II	=	1,023	,,
III	=	1,037	,,
	<u> </u>		
say	2,956	rotls,	equal to 29 qantârs and 56 rotls.

This, at P.T. 60 per qantâr, is equivalent to L.E. 17·736 milliemes. Taking the seed yield at 5·63 ardebs, which is the rate per feddân calculated on the basis of the actual production of the six plots which were permitted to produce seed, and taking the price at P.T. 290 per ardeb, we find the value of the seed crop to be L.E. 16·327 milliemes per feddân, making a gross return of L.E. 34·063 milliemes per feddân. This will serve as an indication of the very satisfactory

* The prices per ardeb for ordinary linseed at Mina el Bassal, for October, averaged each week as follows : week ending 6th P.T. 273, 13th P.T. 278, 20th P.T. 295. The quality of the Guemmeiza crop was superior to the usual market sample.

result which can be obtained at the present time with respect to this crop, which only occupies the ground for four and half months.

Experiments are being arranged for in the coming winter with seed of new kinds imported from Ireland and India, the latter with a special view to obtaining better yields of linseed. It is hoped to make these experiments form the subject of a later note.

PUBLICATIONS.

“Agricultural Journal of Egypt”: published as often as sufficient material is collected.

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AGRICULTURAL JOURNAL OF EGYPT.

Volume	I, Part I	...	English P.T.	2,	Arabic P.T.	2.
„	I „ II	...	„	„	2	„ „ 2
„	II „ I	...	„	„	2	„ „ 2
„	II „ II	...	„	„	3	„ „ 3
„	III „ I	...	„	„	3	„ „ 2
„	III „ II	...	„	„	3	„ „ 2
„	IV „ I	...	„	„	3	„ „ 2
„	IV „ II	...	„	„	3	„ „ 2
„	V, Parts I and II.		„	„	5	„ „ 4
„	VI		„	„	5	„ „ 4

EGYPTIAN AGRICULTURAL PRODUCTS.

By Gerald C. Dudgeon, F.E.S., etc., Consulting Agriculturist.

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- No. 2 A. “The Ground Nut or Earth Pea (*Fül Sulâni*) in Egypt.” P.T. 2.
- No. 3 A. “*Gossypium* Spp., Cotton (*Qotu* in Egypt).” History, Development, and Botanical Relationship of Egyptian Cottons, with tables showing Areas, Yields, Prices, and Distribution of the Varieties. P.T. 5.

TECHNICAL AND SCIENTIFIC BULLETINS.

- No. 1. “Report on the First Two Years’ Working of the Plant Protection Law” (Law No. 5 of 1913), by G. Storey, B.A., F.E.S. (English or French.) P.T. 2.
- No. 2. “The Nature of the Damage done by the Pink Boll Worm (*Gelechia Gossypiella* Saund.),” by Lewis Gough, Ph.D., F.E.S., etc. (English or French.) P.T. 1.
- No. 3. “Note on the Alkaloids of some Egyptian Solanaceae,” by Frank Hughes, F.C.S., Chemist. (English or French.) P.T. 1.
- No. 4. “The Life History of *Gelechia Gossypiella* from the Time of the Cotton Harvest to the Time of Cotton Sowing,” by Lewis Gough, Ph.D., F.E.S., etc. P.T. 1.
- No. 5. “List of Egyptian Insects in the Collection of the Ministry of Agriculture,” by G. Storey, B.A., F.E.S. P.T. 10.

TECHNICAL AND SCIENTIFIC BULLETINS (*continued*).

- No. 6. "Note on a Machine to kill *Gelechia* Larvæ by Hot Air, and the Effects of Heat on *Gelechia* Larvæ and Cotton Seed," by Lewis Gough, Ph.D., F.E.S., etc. P.T. 2.
- No. 7. "Work in Connection with Egyptian Wheat," by G. C. Dudgeon, F.E.S., and G. B. C. Bolland, B.A., Botanist. P.T. 1.
- No. 8. "Work conducted at the Experimental Farm at Giza in Connection with Great Millet and *Bersim*," by B.G.C. Bolland, B.A., Botanist. P.T. 1.
- No. 9. "Work in Connection with Egyptian Maize," by Gerald C. Dudgeon, F.E.S., Consulting Agriculturist, etc., and B. G. C. Bolland, B.A., Botanist. P.T. 1.
- No. 10. "Some Tests of Flour made from Egyptian Wheat," by Frank Hughes, F.C.S., Membre de l'Institut Egyptien, Chemist. P.T. 1.
- No. 11. "Simon's Hot Air Machine for the treatment of Cotton Seed against Pink Boll Worm," by G. Storey, B.A., F.E.S., Entomologist. P.T. 1.
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