

SUNFLOWER IN EGYPT

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BACKGROUND

Cotton seed is the main source of edible oils in Egypt, in addition to small quantities of soybeans, both being currently the only crops that are utilized for oil extraction. Total annual seed devoted for crushing is about 700,000 M.T., of which 600,000 from cotton and 100,000 from soybeans. These quantities produce some 115—120,000 M.T. of processed oil, representing about 25—30% of the domestic needs, where 70—75% are imported.

Other oil crops grown in Egypt include sesame, peanuts and sunflower over a total area of about 100,000 feddans. These oilseed crops are food crops as they are not utilized for oil extraction purposes. Though these crops are grown on small areas, they are high-income cash crops and could have been of major economic importance, should their areas be expanded.

Over the past three years, some progress has been achieved in raising the average yield levels of these crops. However, the improvement of national production is confronted with various constraints that can be outlined as follows :

— Competition of other cash crops together with scarcity of agricultural land, resulted in decreasing the projected areas ;

— The increase of production costs due to severe shortage of hand labour and high labour wages. This has been associated with improper field operations and recommended agro-techniques ;

— Lack of farm machinery appropriate for the prevailing small holdings ;

— Yield fluctuations as affected by the different disease infestation.

Realizing the importance of oilseed crops, comprehensive research programmes have been designed to improve these crops.

SUNFLOWER STATUS IN EGYPT

Great emphasis had been given to sunflower over the past 10 years with regard to varietal and agro-technique improvement as a new source for edible oil industry being superior to other oil crops in terms of yield of oil per

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unit area. The following table represents the area under sunflower cultivation, average yield/feddan and the total production over the period 1970—1980.

Year	Area (feddans)	kg/feddan	Total production (M.T.)
1970—74	23 000	697	16 045
1975—79	16 800	692	11 637
1980	11 770	780	9 175

Data of the above table show that the area in 1980 had been reduced by 51% as compared with the 5 year period 1970—74, the average yield per feddan had increased by 11%. This could be attributed to the fluctuation of market prices from one season to another as the whole production is used for direct consumption after being salted and roasted and not for oil extraction.

THE EXPANSION OF SUNFLOWER PRODUCTION

As previously mentioned that sunflower is one of the most promising oil crops for oil industry together with its adaptability under various ecological regions, horizontal and vertical agricultural expansion of sunflower production has to be designed as given in the following :

a. MULTIPLE CROPPING SYSTEM

Limited land resources represent a major constraint to the horizontal agricultural expansion, whereas, irrigation water in adequate quantities is available all year round.

Under these conditions, continuous cropping is the general rule all over the country through the application of crop rotation system of particular sequence of crops. The ultimate results of these systems is a very high cropping intensity. There are almost two crops a year in the same field, giving a cropping index of 2.0 (or 200%), on an overall national level.

Being confronted by the limitation of land resources, the progress of Egyptian agriculture over the past decades has been essentially accomplished through vertical growth.

However, in view of the ever-increasing demand for agricultural products and the fact that vertical growth cannot cope with the domestic demand and export requirements, government policies have been designed to further increase the cropping intensity. This involves inter-cropping and relay inter-cropping that represent the "multiple cropping system".

Experimental trials have indicated the feasibility of this system with regard to certain group of crops, taking into consideration yield performance and the net return obtained per unit area.

Based on these studies, preliminary results dealing with yield productivity were very promising as given in the following :

— In rice fields, sunflower was planted during March, followed by rice sown on June on the same field. Yield obtained of both crops during the 3-year period of the study was as follows :

Year	Yield (kg/feddan)	
	Sunflower	Rice
1979	838	806
1980	667	1 547
1981	1 370	under estimation

The above data, clearly show that planting sunflower did not affect the productivity of rice.

Further studies are needed to find the best multiple cropping system that gives the maximum yields and higher net return, which could be brought into application on growers fields.

b. THE EXPANSION OF SUNFLOWER IN THE NEW LANDS

There is no place in the present existing rotation of the valley and the delta for non-traditional or new crops to be cultivated due to the intensified cropping system being practiced. The future prospect of this crop will be apparently in the new lands and fortunately research work proved its success in the calcareous soils which represent a great part of our new lands especially in the western delta.

RESEARCH PROGRAMME

The research programme designed for sunflower improvement includes the following activities :

- Develop suitable cultivars for the different agro-ecological regions of Egypt which would be characterized by :

- high yield of seed and oil,
- short duration,
- tolerant to salinity and drought,
- tolerant or resistant to diseases and orobanche.

- To develop appropriate agronomic practices for high productivity especially those dealing with the minor elements and weed control ;

- Test, evaluate, and demonstrate the suitability and profitability of growing sunflower in the different regions of the country ;

- Inter-cropping and relay inter-cropping studies to increase the cropping intensity with regard to yield performance and net return per unit area ;

- Screening for disease reaction under normal field conditions and artificial infection with the causal organism of the most prevalent diseases.

SUMMARY OF RESULTS

In accordance with the plan of work designed for sunflower improvement, summary of results obtained, could be given in the following :

1. Evaluation of breeding material had showed a wide range of genotype differences among the agronomic characteristics related to yield (plant height, head and stem diameter together with oil content and disease reaction) that could offer a large scope for various breeding purposes.

2. Artificial infection with a complex of the soil-borne fungi : *Rhizoctonia solani*, *Sclerotium bataticola* and *Fusarium oxysporum* gave negative results within the tested material.

On the other hand, only soft and dry rot of sunflower heads caused by *Rhizopus nigricans* and *Trichothecium roseum* respectively were prevalent among 71 strains with a range of 5—33%, whereas, 33 strains of the tested material including Giza 1 and Miak (chek), were free from these two diseases.

3. Disease incidence was recorded at harvest time for entries tested in yield trials at Northern and Western Delta.

The data obtained had showed the prevalence of leaf spot disease caused by several soil-borne fungi, being isolated *Alternaria* sp., *Curvularia* and *Macrophomina* in both locations.

4. Improvement of Miak strain (early maturing and high oil content), has been achieved where an increase of 2—5% in oil content was obtained over the original seed stock (38%).

5. Initiation of a synthetic population to develop a synthetic variety of higher seed yield and oil content.

6. Evaluation of yield potential, where 11 variety yield trials were carried out as illustrated in the following table :

Yield test	No. of en-tries	No. of loca-tions	Yield kg/fed. (range)
— American hybrids	6	3	1 131—1 519
— 1 st International trial	20	2	1 014—1 551
— 2 nd International trial	8	3	1 085—1 439
— Advanced yield	20	3	815—1 211

7. According to the studies dealing with the improvement of agro-techniques, the following recommendations are given to the growers :

- date of planting : March—April
- plant density : 2 300 plants/fed. (60×30 cm)
- fertilizers rate : 30 N+30 P
- irrigation frequency : 6—7 waterings

LA CULTURE DU TOURNESOL EN EGYPTÉ

Résumé

En Egypte les principales plantes dont l'huile comestible est extraite sont le coton et le soja. Au cours des dix dernières années, le tournesol a pris de l'importance, due en grande partie au fait que la production d'huile/ha est plus grande. Comparé aux autres cultures oléagineuses, le tournesol est plus adaptable aux conditions adverses de l'environnement. En culture irriguée on peut obtenir normalement deux récoltes par an, et l'on essaye de réaliser un système de cultures multiples („multiple cropping system“). En tenant compte du potentiel de rendement et du bénéfice net/ha, on propose pour les rizières la succession suivante : tournesol ensemencé au mois de mars et riz ensemencé en juin. Le tournesol peut être cultivé sur des terrains fraîchement mis en culture. Cette espèce est bien adaptée aux sols calcaires, qui représentent la plus grande partie des nouveaux terrains, spécialement dans l'Ouest du Delta. Le programme des recherches comprend l'obtention ou l'identification de nouvelles variétés à fort potentiel de rendement, précoces, résistantes à la salinité du sol et à la sécheresse, aux maladies et aux ravageurs ; une technique culturale adéquate, spécialement en ce qui concerne l'application des oligoéléments, le desherbage et l'assolement. Les pathogènes les plus fréquents chez le tournesol et pour lesquels des sources de résistance n'ont pas encore été trouvées, sont : *Rhizoctonia*

solani, *Sclerotinia bataticola* et *Fusarium oxysporum*. Seulement deux variétés-population : Giza 1 et Maiak sont résistantes au *Rhizopus nigricans* et au *Trichothecium roseum*. D'autres pathogènes, tels que *Alternaria* sp., *Curvularia* sp. et *Macrophomina* sp. parasitent les feuilles. La variété Maiak a été soumise à des travaux de sélection pour la précocité, la teneur élevée en huile et la résistance aux maladies. Actuellement les travaux poursuivent l'obtention d'une variété synthétique, l'évaluation d'un grand nombre de hybrides étrangers et de variétés-populations en essais comparatifs et la mise au point des principales techniques culturales pour la culture du tournesol en Egypte.

GIRASOL EN EGIPTO

Resúmen

Las principales plantas de las cuales se extrae el aceite comestible en Egipto son el algodón y la soja. En los últimos diez años el girasol ha adquirido cada vez más importancia mostrándose más productivo en cuanto a la cantidad de aceite por hectárea y presentando una adaptabilidad superior a condiciones no favorables de medio en comparación a otras culturas oleaginosas. En los terrenos con posibilidades de irrigación se suelen obtener dos recolectas normales por año. En éstas se persigue realizar un „sistema múltiple de cultura“ (multiple cropping system). Tomando en consideración la capacidad de producción y el ingreso neto por unidad de superficie, una valiosa sucesión de culturas en arrozales se ha mostrado : el girasol sembrado en marzo y el arroz sembrado en julio.

El girasol se puede extender sobre terrenos nuevos ; las investigaciones de los últimos años han mostrado que esta especie da resultados buenos en los suelos calizos que representan gran parte de los terrenos nuevos, especialmente del Oeste de la Delta. El programa de investigación persigue crear o intensificar los cultivares de gran productividad, precoces, resistentes a salinidad y sequía, enfermedades y parásitos, establecer tecnologías de cultura adecuadas, sobre todo en lo que concierne la aplicación de microelementos, combatir las malas yerbas, rotar las culturas.

Los más difundidos patógenos que atacan al girasol y contra los cuales no se han encontrado todavía fuentes de resistencia son : *Rhizoctonia solani*, *Sclerotinia bataticola* y *Fusarium oxysporum*. Al ataque de *Rhizopus nigricans* y *Trichothecium roseum* tan solo dos variedades—poblaciones han resultado resistentes : Giza y Maiak. Están difundidas también enfermedades que afectan las hojas : *Alternaria* sp., *Curvularia* sp. y *Macrophomina* sp. Hasta el presente se ha efectuado una selección en el marco de la variedad Maiak para precocidad, contenido elevado de aceite y resistencia a enfermedades. Se ha iniciado la creación de una variedad sintética, se han evaluado en culturas comparativas varios híbridos extranjeros y variedades—poblaciones y se han establecido las principales medidas agro-fitotécnicas para el cultivo del girasol en Egipto.