NUTRITIVE VALUE OF SUNFLOWER PLANT AND ITS PRODUCTS

BY

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B.Sc. Agric. (Animal Production)
Ain Shams University, June 1963

Thesis submitted to the Faculty of Agriculture
Ain Shams University, in partial fulfilment
of the requirements for the degree of

MASTER OF SCIENCE
(Animal Nutrition)

1969

Approved :

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(Committee in Charge)

Date :

ACKNOWLEDGMENT

I wish to thank Prof. Dr. S. El-Khishen, Head of the Animal Production Dept., Faculty of Agriculture, Ain Shams University for his encouragement and providing the necessary facilities.

I seize this opportunity of expressing my deep sense of gratitude to Dr. Osman Shehata, Prof. of Animal Nutrition, Faculty of Agriculture, Ain Shams University for close supervision, valuable guidance, keen interest and helpful criticism through the preparation of this work.

I wish to express my thanks to Dr. A. Anwar, Assistant prof. of Poultry nutrition for his helpful suggestions.

I also wish to record my gratitude to Dr. M. Afifi, Assistant prof. of Poultry nutrition for his cordial encouragement and valuable help in carrying out this research.

My grateful thanks are also due to Dr. M.E. Lasheen Lean of the Higher Institute of Agric., Shebin el-Kom for providing the necessary facilities.

C O N T E N T S

INTRODUCTION

Sunflower plant (Hlianthus annus) originated in Latin America, however, it was first developed as an oilseed crop in southeastern Europe. Sunflowers are cultivated mainly for oil. The seed contains 20-32 % oil, the residue from seed extraction makes a high quality protein feedstuff for poultry and livestock. Sunflower leaves, before being ripe, are used as a forage suitable for cattle and sheep for its high content of protein which amounts to 3.8 % as compared to corn leaves which contain 1.5 % of protein.

Sunflower seed has many uses :-

Sunflower seed :

The chewing kind of sunflower seed has a large seed, a thick hull and a loose kernel. In gross composition it runs 40-50 % hull, 20-25 % oil and yields 25-35 % decorticated sunflower-seed oil meal. The oil type of sunflower seed has a small seed and thin hull which tightly fits the kernel. In gross composition it runs 35 to 45 % hull, 25-35 % oil and yields 30-40 % decorticated sunflower-seed oil meal.

Some people relish sunflower seeds as a confection, and eat them either roasted or raw. The travellers in Russia are familiar with their use as a food for a train journey. A considerable amount of seed is used in mixed poultry and bird feeds.

Sunflower-seed oil :

Unhulled sunflower seed contains from 20 to 32 percent of oil. Hulled seed or (meats) contain 50 to 55 percent of oil. Sunflower seed oil is pale yellow with a mild taste, a pleasant flavour and has only a slight odor, it is considered as a semi-drying oil. The oil can be used in several purposes for the human consumption and for industry. The cold pressed oil is usually esteemed as a salad and cooking oil. Considerable quantities are employed in making butter substitutes. The hot pressed oil which has a reddish yellow colour is used in the manufacture of paper, plastics, glues, soap, paints, varnishes, and certain pharmaceutical products. The refined hot pressed oil can be used for edible consumption.

It is interesting to note that according to a survey made at 1960, the oil production in the World reached 15 million tons distributed acoording to the sources as follows:

at the Illinois Agric. Exp. station show that the meal can be combined with bread and pastry flours with excellent results.

Sunflower plants were first cultivated in U.A.R. during 1949 in about 15 feddans at Menia province, in Upper Egypt. The cultivated area was expanded to about 400 feddans during 1953 at several provinces of Upper and Lower Egypt. But, in 1955, the area was decreased to 60 feddans.

Since 1952, the oily crops Research Section of the Ministry of Agriculture has directed the attention towards the cultivation and development of new varieties having superior properties in both, the crop yield per feddan as well as the oil content of the seeds.

The planting of sunflower crop is progressed and expanded through the World as presented in the following table.

Sunflower distribution in some countries
(Average two years 1960-1961)

Country	Area (1000 feddans)	Average yield seed Kg./fed.
Europe		
Bulgaria	568	550
Hungary	198	460
Rumania	1,183	420
France	7	714
Europe total	2,929	463
U.S.S.R	9,626	361
North and South America		
Canada	32	412
Argentina	2,370	290
Uruguay	369	400
America total	2,881	306
Asia		
Turkey	3.36	374
Asia total	345	374
Africa		
Kenya	12	218
Morocco	10	248
U. of S.Africa	357	277
Africa total	488	269
Australia	10	290
World total	16,441	349

After Abu-Sayed 1963.

In Egypt, there is a substantial shortage in tha available foodstuffs in summer time where most of the cattle are fed on dry rations. In the contrary, there is an excess of such foodstuffs than the allowances required by the livestock in the winter time, where most of the cattle are fed on green clover (berseem). However, the total annual requirements are certainly much more than could be supplied by the available foodstuffs.

The following is an approximate distribution of the seasonal and annual nutritional requirements, expressed in Starch Equivalent units (S.E.) and the nutrient supplied by the available feedstuffs.

	Winter and Spring green clover only (Tons S.E.)	Summer and Autumn dry foodstuffs only. (Tons S.E.)	Total (Tons S.E.)
Available foodstuffs.	3,199,500	982,010	4,181,510
Livestock requirement	2,768,098	2,768,098	5,536,197
Balance	+ 431,402	- 1,786,088	- 1,354,687

It could be seen that there is an ill-distribution of food available for animals throughout the year. Increasing the available food sources for animals in summer could be achieved by :-

1- Use of grains, but this is usually expensive and unavailable because grains constitute the basic food for human use.

2- Conservation of the excess green berseem in the forms of hay and silage. This will partly solve the problem of shortage.

3- Cultivation of summer green fodders and forages such as Sudan grass, Nagro corn and green corn.

4- Use of other source of rouphages and concen - trates. Corn stovers, rice straw are very prospective available rouphages. Oil-cakes such as linseed, peanut, and sunflower oil cakes are very prospective concentrates.

The main concentrate in Egypt is the cottonseed oil cake. The annual production of such by-product is, as its highest yield, 600.000 Tons. This quantity is much less than that required by the livestock in Egypt. On the other hand it is not easy to expand the cultivated area of cotton due to numerous economical reasons.

Therefore, it becomes of urgent necessity to look for other sources of oil crops to produce oil and cakes, such as sunflower seeds which are considered one of the prompt resolutions of the oil and cake shortage in U.A.R.

The recently reclaimed area amounting to more than 700,000 feddans can, partly, be used for growing sunflower plant. Most of these newly reclaimed soils are of the sandy and calcareous types which are quite suitable for sunflower cultivation. Certainly, the yield of oil and oil-cake will contribute a substantial role in covering the shortage of such feed-stuffs for both human and animal.

REVIEW OF LITERATURE

History of Sunflower and Its Use as Feedstuff for Farm Animals

Mangold (1924) found that sunflower seed oil meal is well-liked by stock and keeps well in storage. It is popular in Europe for all classes of stock, especially dairy cows.

Petrov and Dimakov (1932) have described its use for the production of detergents and Petrov and Grinberg (1938), have shown that sunflower protein may be used for the production of plastic materials.

Rudorf (1948), had shown that the heads receptacles of the sunflower plant may be used as a source of pectin and that the stalks, which contain 40 to 48 % a cellulose by special chemical treatment may be used in the production of paper and textiles.

Martin and Leonard (1949), reported that in Russia the seeds of the sunflower are used extensively for food. In the United States the seeds are used chiefly for poultry feed, and the entire plants, are widely used for making.

Kester (1950), showed that until 1948, practically all the sunflower seed oil American used was imported. The small amounts of sunflower seed raised previously in the United States had been used principally in feeds. Sunflower might be regarded as an important oil seed crop in the United States. The oil is excellent for use in salad oils and shortening.

Weibel (1951) reported that sunflower-seed meal is high in protein of a high biological value. Meal processed from whole seed will average about 35 percent protein, from hulled seed, as much as 50 percent. The author reported also that sunflower-seed meal competes directly with cotton-seed, linseed, peanut, and soybean meals and interchangeable with them in livestock feeds.

Clandinin (1958) stated that sunflowers are cultivated mainly for oil, the better sunflower oils are used in the manufacture of margarine, shortening, and salad oils, and the poorer quality oil are used in soaps, paints, varnishes and lubricating oils. The seed contains 20-32% oil and when decorticated before extracting the residue makes a high quality protein feedstuff suitable for incorporating in poultry and livestock feeds.

The author stated also that the other by-products of sunflower is the husks obtained in the decortication of

sunflower seed prior to extraction of oil may be used as bedding for poultry and livestock. In Canada, however, most of the hulls are molded under high pressure into logs which are suitable for burning in fireplaces.

Wolfe and Kipps (1959), stated that the sunflower was one of the food plants of the American Indian and was cultivated in Spain as early as 1597. The sunflower cultivated in Europe were no doubt derived from plants developed by the American Indian.

Spread of Sunflower in the World

According to figures released by the Commonwealth Economic Committee (1954), 15.3 million acres of land were devoted to the production of sunflower seed in the crop year 1953-54 in the principle sunflower-production countries, compared with the record crop acreage of 17.4 million acres in 1950-51 and the 1938-39 figure of 9.9 million acres. In 1953-54 the Soviet Union had the largest acreage (9.4 million acres) devoted to the production of sunflower seed. Argentina was the second most important producting country having 1.413.000 acres in sunflower production. The Soviet Union figure represents