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Technology and Product-Mix Forecast —Oils and Fats in 2000 A.D.

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Groundnut Production in The semi-arid Tropics — Problems and Progress

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Groundnut is a major oilseed and edible nut crop in many tropical, subtropical, and warm temperate regions of the world. In 1979 there was an estimated world production of 18.4 million metric tonnes of groundnuts from 18.6 million hectares (Table 1). Asia is the largest producer (10.2 million tonnes), followed by Africa (5.2 million tonnes), North America (1.9 million tonnes) and South America (0.9 million tonnes). Of the individual countries, India is the largest producer in the world (5.7 million tonnes), followed by China (2.6 million tonnes), USA (1.8 million tonnes), Sudan (1.1 million tonnes) and Senegal (0.9 million tonnes). About 80% of world production comes from developing countries and 67% of the total is produced under rainfed conditions in the semi-arid tropics (Gibbons, 1980).

Groundnut production practices around the world range from primitive farming with very little input of fertilizer and pesticides to highly mechanized farming utilizing high inputs of fertilizer and pesticides (Cummins and Jackson, 1982). Average pod yields in the semi-arid tropics (SAT) are low, around 800 kg/ha, compared to 2500 kg/ha or more in the countries with developed agriculture such as the USA. Pod yields from individual countries utilizing low level technology vary from just 400 kg/ha in Mozambique and Niger to over 800 kg/ha in Senegal, Burma and India while yields of 1250 to 2925 kg/ha have been recorded from countries such as Australia, Venezuela, Brazil and USA utilizing high levels of technology (Table 2). Australian groundnut production utilizes a high level of technology including complete mechanization and heavy capital inputs but yields are low, around 1250 kg/ha, compared to yields of over 2500 kg/ha in Brazil and U.S.A. This is mainly because the crop is grown on clay soils, rather than the sandy soils that are best suited to groundnut production, i.e. soil characters are limiting production. Also, lack of irrigation water is a limiting factor in many areas (Middleton, 1980).

Compared to other oilseed crops and grain legumes, groundnuts are relatively daylength insensitive, and well adapted and produce substantial yields under the low fertility and low input practices of the small farmers of the SAT. In many of the major groundnut-producing countries, a significant proportion of each year's crop is crushed for oil and the cake used for livestock feed. The estimated oil yields from some countries are given in Table 3. India is the largest groundnut oil-producing country followed by Brazil, Burma, Argentina and Nigeria. India was an exporter of groundnuts and groundnut products a few years ago but now imports edible oils. The present requirement of edible oils in the country is around 3.8 million tonnes and the production is 2.6 million tonnes. Thus there is a shortage of 1.2 million tonnes which is made good through imports at a cost of about Rs. 800 crores to the country's exchequer. The problem is likely to escalate further, as the edible oil requirement of India will be around 4.3 million tonnes by the end of 1983-84 (Swaminathan, 1980). Other countries that use groundnut oil for cooking are Argentina, Burma and Nigeria while Brazil exports 92% of its oil production. In Senegal, Sudan, Malawi, Australia and USA, about 70% of the groundnut production is either consumed domestically as whole groundnut products (groundnut butter, confections, etc.) or exported as kernels for similar food uses elsewhere (Cummins and Jackson, 1982). In the USA, groundnuts that contain just too high a level of aflatoxin for them to be used for human consumption are crushed for oil but the cake may not be used for human and animal food.

Table 1

Area cultivated to groundnuts and production of dried pods in 1979 for major producing countries

Country	Harvested area (1000 hectares)	Production of dried pods (1000 metric tonnes)
India	7,275	5,700
China	2,525	2,638
USA	617	1,804
Sudan	980	1,100
Senegal	975	900
Asia	11,518	10,266
Africa	5,680	5,238
South America	689	945
World Total	18,659	18,437

Source : Cummins and Jackson (1982)

CONSTRAINTS TO PRODUCTION

Diseases and pests are major constraints to groundnut production. The unreliable rainfall patterns of the SAT and recurring droughts late in the season are also important factors limiting groundnut production. Other factors that contribute to low yields are lack of high yielding adapted cultivars, poor agronomic practices, and limited use of fertilizers.

Diseases :

The most widespread, and certainly the most important fungal diseases in the SAT, are seed and seedling diseases, leafspots, rust and pod rots (Mehan *et al.*, 1983). An economically important virus disease of restricted distribution is rosette that occurs only in Africa where it causes severe losses.

Table 2

Groundnut production in countries utilizing high and low levels of technology, 1979

Country	Level of Technology	Harvested area (1000 hectares)	Production (1000 metric tonnes)	Average pod yield/ha**
Australia	High	36	51	1,250
Paraguay	High*	21	18	1,300
Venezuela	High	14		1,800
Brazil	High	290	470	2,200-2,500
USA	High	617	1,804	2,925
Mozambique	Low	200	100	400
Niger	Low	160	85	450
Malawi	Low	239	165	690
Senegal	Low	975	900	830
Burma	Low	668	450	830
India	Low	7,275	5,700	850
Indonesia	Low	530	792	975

Source : Cummins and Jackson (1982)

* 50% area (Western Region of Paraguay) is under a high level of technology.

** Dried pod yield at a shelling percentage of 70.

Table 3

Groundnut production and usage for oil extraction in some groundnut growing countries, 1979

Country	Production of dried pods (1000 metric tonnes)	Weight of dried kernels used for oil extraction* (1000 metric tonnes)	Estimated total oil yield** (1000 metric tonnes)
Argentina	400	228	72
Brazil	470	252	113
Burma	450	220	99
India	5,700	3,192	1,436
Nigeria	250	87	39

* Based on estimated shelling percentage of 70.

** Oil yield calculated on the basis of 45% oil content of kernels.

1. *Seed and seedling diseases :*

Seed rots and seedling diseases are of common occurrence in the SAT and collectively are responsible for 10-20% yield losses (McDonald, 1970). The problem is much worse in the less developed regions of the SAT than in regions where good quality seed is sown to produce optimum populations. Many farmers plant at a population level far below optimum and any emergent losses have direct effects on yield. These diseases may develop from fungi already established in the seeds before sowing, or may result from invasion of seeds and seedlings by soil fungi. Fungi commonly associated with seed rots and seedling diseases include species of *Aspergillus*, *Macrophomina phaseolina*, *Rhizoctonia solani* and *Fusarium*. Use of good quality, disease-free seed can help control seed rots and seedling diseases. Application of seed protectant fungicides such as thiram or captan has also proved effective in preventing attack on seed and seedlings by some soil fungi and has also reduced superficial seed-borne infections (McDonald, 1970 ; Garren and Jackson, 1973).

2. *Rust and Leafspots :*

Rust and leafspots are major causes of yield loss in groundnut worldwide (Subrahmanyam *et al.*, 1980). Leafspots (incited by *Cercospora arachidicola* and *Cercosporidium personatum)* often cause yield losses between 10 and 50% in many areas of the SAT (Garren and Jackson, 1973). When one, or both of the leafspot diseases are accompanied by rust (caused by *Puccinia arachidis*), yield losses of up to 70% may be recorded (Subrahmanyam *et al.*, 1980).

The diseases can be controlled by application of fungicides (benomyl and carbendazim for control of leafspots and chlorothalonil for control of both leafspots and rust) but this may not be economically feasible for small farmers of the SAT.

3. *Pod rots :*

Pod rots (caused by a complex of soil inhabiting fungi) are serious diseases of groundnut in some areas of the SAT. The disease is probably much more important than is at present realised and in addition to reducing pod yields (from 10 to 25 percent) can have a serious effect upon crop establishment and on quality of produce (Mehan *et al.*, 1983).

Much needs to be learnt about factors affecting pod rots before effective disease management can be advised. Much effort has been expended in recent years in screening germplasm lines for resistance to pod rots in several parts of the world.

4. *Rosette disease :*

Rosette is the most important virus disease of groundnuts in Africa south of the Sahara. In 1975 the disease appeared on one million hectares of groundnuts in Nigeria causing yield losses estimated at around 325,500 tonnes