CARIBBEAN FOOD CROPS SOCIETY

PROCEEDINGS

ELEVENTH ANNUAL MEETING

A SUMMARY OF PEANUT RESEARCH IN BARBADOS

by

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INTRODUCTION

The plant *Arachis hypogaea* is of great commercial importance in several tropical and subtropical areas of the world. It is the world's third most important oil seed after Soya beans and Cotton seed.

The fruit before it is processed is commonly referred to as ground nuts or peanuts. The processed product is almost exclusively referred to as peanuts. The peanut is marketed in both the natural (shelled and unshelled) form or in processed products such as peanut oil and peanut butter. The peanut and its products are of high nutritional value and are grown mainly for human consumption. The crop can be used for feeding livestock, and the highly flavoured 'Smithfield' hams were originally produced from pigs fattened on peanut cake.

In Barbados there were several attempts to introduce peanuts as a peasant crop. Unfortunately, the crops were never extensively or intensively cultivated in Barbados. This was a result of the local dominance of sugar production, and also of the minor role to which peasant crop cultivation had been relegated. The reports of the

Agricultural Department suggest that peanuts were being cultivated in Barbados before the 1940's.

Attempts at improvement of this in the early 1940's was limited solely to the importation of varieties from the Unites States, South Africa and West Africa. The main characteristics for which the nuts were to be selected were yields and earliness of fruiting (Short season crop). The Agricultural reports of the Department of Agriculture in Barbados do not indicate which varieties were the most successful and important.

Further, it is not possible to determine how extensively the peanut trials were carried out, or what was the final disposition of the seed.

In spite of this apparent early neglect, peanuts were continually grown on a small scale by some peasants, particularly in areas of St. Lucy, St. Peter and St. Philip.

The seed used for planting was kept from year to year and was of a variety which exhibited seed dormancy. Recently in Barbados this local variety has been the subject of controversy among agronomists and growers. Some agronomists claim that the local variety now being grown is a recently introduced Spanish variety of Mexican origin. Most growers however, claim that this local variety is a variety that has been cultivated by them for more than 20 years. It is not particularly easy to determine the origin of this local Barbados variety.

ECONOMIC IMPORTANCE

Peanuts are produced in many areas of the tropics and sub-tropics. India is by far the largest world producer, with a production of about 5.4 million tonnes (6 million tons) in 1965. The Americas, Brazil and the United States of America were the largest producers in 1965, producing more than 880,000 tonnes (980,000 tons) of peanuts. In the Caribbean the only significant producer is the Dominican Republic which had a 1965 production of about 45,000 tonnes (50,000 tons).

Barbados has been an importer of peanuts and peanut products. In 1966 Barbados was importing 1.8 Kg (4 lbs) of peanuts per person; this figure dropped to approximately 0.9 kg (2 lbs.) per person in 1967. The value of the crops imported in 1966 was $373,871 EC, while in 1968 the value of the imported crop was $197,018. Table 1 shows the quantities of nuts imported in 1966, 1967 and 1968, the value of the crops and the countries of origin.

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Table I

Ground nut imports into Barbados 1966–68

Country of Origin	Kg Imported 1966	Kg Imported 1967	Kg Imported 1968	Value C.I.F. 1967	Value C.I.F. 1967	Value C.I.F. 1968
U.K.	32,806	5,073	–	51,595	7,830	–
Canada	5,804	8,618	21,682	20,339	17,679	19,152
St. Vincent	18,681	9,885	16,652	10,120	6,641	4 032
Trinidad	107	100	–	100	118	–
U.S.A.	465	73	600	1,397	76	448
Mexico	201,847	145,867	369,999	143,708	98,558	136,478
Turkey	87,547	56,602	–	65,879	21,381	–
Syria	6,045	3,904	25,319	4,737	2,727	8,681
Formosa	–	25,873	–	–	18,929	–
Egypt	10,971	–	–	75,024	–	–
Brazil	163	–	–	230	–	–
Israel	–	–	79,362	–	–	28,230
Totals	364,436	255,996	513,614	373,129	173,939	197,021

MARKET POTENTIAL

There is a good market for peanuts in Barbados and throughout the Carifta territories.

The average market requirements for unprocessed peanuts in Barbados during the period 1969–1972 was 104,420 kg (230,000 lbs) of nuts. The average Carifta requirements during the same period (1969–1972) were 1.04 million kg (2.3 million pounds) of nuts. In Barbados the import market for processed nuts was 50% of the fresh market imports.

We can therefore make the following projections for Carifta requirements for unprepared nuts.

1974 = 1.10 million kg (2.43 million pounds) of unprocessed nuts
1976 = 1.20 million kg (2.46 million pounds) of unprocessed nuts
1978 = 1.32 million kg (2.91 million pounds) of unprocessed nuts

The target demand in 1978 being 1.4 million kg (3 million pounds) of nuts. If we assume that the potential market for processed nuts is 50% of the fresh market we can assume a potential of about 0.7 million kg (1.4 million pounds) of processed peanuts products – mainly salted nuts and peanut butter.

It ought to be noted that should the demand for the processed nuts be under-estimated it will be possible to shift the fresh market quantities into the processed market. It is also safer to assume that a large quantity of the unprocessed nuts sold are roasted by the individual retailer.

A GENERAL CLASSIFICATION

The peanut *(Arachis hypogea)* belongs to a small genus of leguminous oil seeds. The plant is native of South America and was probably brought into the Caribbean by the South American Indians.

The crop is grown mainly in the tropics and subtropics. The plant is deep rooting and can be grown in the dry tropical areas with short wet seasons (3–4 months).

Professor S. W. Purseglove in "Tropical Crops", Volume I, gives a full botanical description of the Genus. This bulletin attempts only to assist farmers in being able to recognize some of the characteristics among the varieties now being grown by them.

There are several classifications of peanut varieties, the more detailed classifications of varieties are based on the growth habit, the pod size and shape, the kernel and colour characteristics. The commercial grower usually needs to identify two groups of peanut varieties; plants in each group may show some variations or modifications which identify the groups.

In the first varietal group of peanut plants, the inflorescences are observed to develop at the second and at most of the successive nodes of the first and subsequent branches. The flowering in this group of plants occurs at an early stage of development. As a result of the growth and flowering habits, these plants appear bunchy and fruits are produced near to the base of the main stem. There is no seed dormancy in this group of plants and the mature seeds are seen to develop shoots while immature seeds and flowers are still developing on the plant. The varieties which belong to this group usually mature in 3 – 4 months under local growing conditions. It is desirable to harvest these plants early and avoid excessive loss due to 'sprouting.'

It is reported that plants among these varieties are most susceptible to *Cercospora* leaf spot damage. Under local soil conditions the varieties in this group all tend to show yellowing. In general chlorosis and necrosis due to some plant nutritional imbalance are most pronounced among these varieties in Barbados.

In the second distinguishable group of peanut varieties, the flower inflorescences do not appear at as early a stage of plant growth as in the

Bunching type. The first main stem and first side branch do not bear flowers. There is a tendency for the development of alternate vegetative and reproductive branches. At the first two nodes vegetative growth occurs while at the following two nodes reproductive growth occurs. This pattern of two vegetative and two reproductive branches is repeated during the whole period of growth and development of the branch.

This development pattern results in a production of fruits over a widely dispersed area under the plant. The maturity of fruits is less uniform and the length of the growing season in Barbados is between 4 to 5½ months. The seeds in this group of varieties show dormancy and cannot be used as planting material immediately after the crop is harvested. A good timing of the harvest date is essential since the stages of seed maturity are more varied. The plants when growing in the field have a flat 'running' appearance and cover the ground surface more completely than the Bunch type varieties.

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PEANUT VARIETIES AND SPACING TRAILS IN BARBADOS

PLANT SPACING

In these Variety Trials, plants were spaced in rows of 30 cm (1 foot) apart in beds 150 cm (5ft) wide, and with 45 cm (1½ ft) between each 150 cm (5 ft) bed. In the Runner type varieties there were 4 rows per bed while in the Bunchy type varieties there were 5 rows per bed. For the various varieties an analysis of plant yields as a function of the number of plants in a 0.9 sq. metre (10 sq. ft) plot, showed there was no difference in the yield of nuts per plant in the various replicates, at several locations around the Island. We can therefore assume that the yields obtained in the variety trials were a good indication of how the plants might be expected to perform under commercial cultivation. (Ref. Page 9). We could also conclude that rows 30 cm (1 foot) apart would not be too close for planting the crop.

Virginia Florigiant

This variety is a Virginia Runner type peanut in which some of the side branches are erect. This growth habit gives the plants in the field a somewhat bunched appearance. The pods and kernels are large, there are usually 2 kernels per pod. The size and yield of nuts have made this the most preferred of the newly imported varieties grown by local farmers. In experiments on various soil types an average yield of 4256 kg/ha (3800 lbs per acre) of incompletely dried nuts (2 days sun-drying 28 – 31°C (82 – 88° F) were obtained. The seeds of this variety exhibit dormancy after harvest. When the dormancy period is broken germination rates of about 80% can be obtained. This high rate of germination under local climatic conditions decreases to a very low value in about 3 – 4 months. The seeds on drying tend to lose their testa quite easily, as a result there is a high frequency of split kernels. This crop matures in about 4 to 4½ months. The seeds of this variety were obtained from Atlanta, Georgia.

Early Runner

This is another variety produced by the Goldkist Seed Company. The plants of the variety tend to cover the ground more closely than the Virginia Florigiant. There are a large number of pods per plant and the yields obtained under local conditions were as good as with the Florigiant. The Early Runner seemed easier to harvest on the black soils than most of the other Runner type which were tried. Yields of 3500 kg/ha (35000 lbs per acre) of incompletely dried nuts (2 days sun-drying) were obtained under local soil conditions. The pods and kernels are smaller than the Florigiant. This variety does not lose its seed coat as readily as the Florigiant and matures 2 to 3 weeks earlier (i.e. 4 months).

Virginia Bunch 67

This variety was tried in Barbados only on the black soil types (verti-sols). The plant is a Bunch type which gave yields as good as the Early Runner. The pods and kernels are similar in size to the Early Runner and the crop is equally as easy to harvest under similar field conditions. This variety is more susceptible to diseases than the Florigiant and Early Runner in the United States and these two varieties are apparently now

perferred in Georgia. During the period of trial there were no serious disease problems in any of the varieties.

The NC-2 and NC-5

These two varieties have been tried in large plots (1/5 ha (½ acre)) mainly on the black soil types (vertisols) of Barbados. The growth habit of these two varieties is somewhat like the Florigiant, and the pods and seeds are similar in size. The yields on most soils were about 3900 kg/ha (3,500 lbs per acre) of imcompletely dried nuts. These seed varieties do not lose their testa as easily as the Florigiant. These varieties have been grown only on one particular farm in the vertisol area.

Starr

The Starr variety is reportedly a high yielding oil nut. In small experimental plots (27 sq metre (300 sq. ft.)) on the verti-sol these plants showed marked lime induced chlorosis and about 5% of the plants died before harvest. The yields seldom exceeded 1700 kg/ha (1500 lbs per acre) of dried nuts. The pods and kernels are small and the variety was not tried in larger commercial plots.

Argentine and Surinam

Bunch type peanuts were tried under similar conditions as the Starr variety. Both of these varieties showed chlorotic yellowing and in the Surinam variety 20 – 30% of the plants died before maturity. In the Surinam variety mature plants seldom had more than 4 or 6 mature nuts per plant.

Tennesse Red

This Spanish type peanut grows in a bunch. The variety was tried under all the various soil conditions along with the Florigiant. This variety when properly spaced (close) yielded 4300 kg/ha (3,800 lbs per acre) (2 days sun-drying). The pods are as long as the Florigiant but usually not as large. The pod average 3 kernels per pod as compared with 2 kernels in the pods of the other small seeded varieties. Among the Bunch type peanuts this variety showed a lesser tendency to suffer chlorosis. The nut has a dark red seed coat which does not break easily. The variety is probably

the best peanut for eating as it has a very good flavour. The seeds do not exhibit dormancy and the mature seeds tend to germinate if the crop is not harvested at an early period 3½ to 4 months.

'Local Peanut'

A local variety obtained from the parishes of St. Lucy and St. Philip (where it is reported that the variety has been grown for several years) was planted in large plot trials. The plants of this variety cover the ground rapidly and there is no tendency to be chlorotic. At locations where all varieties showed some chlorosis this variety remained dark green. The plants matured at about 4½ – 5 months and bore several (13) large mature pods per plant. The yields averaged 2,000 kg/ha (1,800 lbs/acre) dried nuts. In this variety the pods had a high frequency, of 3 kernels per pod.

The long growing season which this variety requires if high yields are to be obtained, has made it less suitable for most of the large growers.

Florirunner

This variety has been recently introduced into Barbados. Yield potential and growth characteristics will be examined before this peanut is released for local commercial production.

VARIETY CHARACTERISTICS

The seed size is an important characteristic for the local retail market. It is also important for farmers to have some idea of seed size so that good planting rates can be achieved, and adequate orders for seeds placed. The varieties are placed in an order which indicates an increasing seed size.

Table 2

Peanut varieties ranked by seed size

Argentine	–	Small 2750 seed per Kg (1250/lb)
Starr	–	
Tennesse Red		
Early Runner		
Virginia Bunch	–	Medium 1750 seed per Kg (800 /lb)
NC–2		
NC–5		
Florigiant	–	Large 1200 seed per Kg (550 /lb)
'Local Barbados'	–	Large 1200 seed per Kg (550 /lb)

SOIL (PHYSICAL ASPECTS)

A good soil on which to produce peanuts should be a soil with good and stable physical structure. These types of soils will facilitate cultivation and allow good seed bed preparation. In peanut production it is desirable to have a good and uniformly prepared seed bed to ensure maximum and uniform seed germination.

In preparing a field for peanut growing, it is usual to rotivate the field after ploughing. The field should also be raked and rolled. Often it is not possible to have the field rolled after raking. When rolling is not possible the field may be allowed to stand and 'dry out' so that the larger soil clods will crack and break into smaller aggregates.

For peanut production one should avoid soils that are too heavy (high in montmorillontic clay). One should also try to avoid any soil compaction during preparation. The penetration of the flowers 'pegs' into the soil is reduced on heavy or compacted soils. This reduced 'pegging'

results in the reduced yields of nuts. Since 'pegs' penetration is important, it is usual to recommend peanut production on soils with a sandy texture or good stable structure as is found in soils with high kaolinitic clay content.

In Barbados experiments have shown that the structure of the Red and Red-yellow soils in St. John (60 series) gave the best yields of peanuts, and were better suited to peanut harvesting than the Red sandy clays of St. James (48, 49 series). The Alluvial sandy soils of St. Andrew were also found to be well suited to peanut production.

The darker soils (30 and 40 series) of St. Philip, St. Lucy and Christ Church were much more variable in structure. On some of these soils the penetration of the flower pedicel was not affected and yields were high at several experimental plots on these soil types. Unfortunately, these soils tend to retain moisture for long periods of time after precipitation, as a result harvesting either by forking or using the mechanical digger shaker equipment is extremely difficult. The major difficulty being the stickiness of the soil, which allows the formation of large 'clumps' which do not easily shatter and which tend to strip the nuts from the plants and bury them under the clumps. The large clumps of soil often cause some damage to the mechanical 'digger shaker' equipment.

On these soils harvesting would have to be carefully planned and timed to the suitable soil moisture conditions if a high loss of nuts and damage to the equipment are to be avoided. It has been observed during experiments that by harvesting the crop at the right stage of maturity, some of the loss of nuts due to poor soil conditions can be avoided.

SOIL (CHEMICAL ASPECTS)

On some of the soils of the 40 series (St. Lucy, St. Philip, Christ Church) symptoms of yellowing have been observed in some fields. This yellowing and necrosis occur in small patches in the field and is more conspicuous in some varieties than in others. The Bunching types of peanuts seem to be more affected by yellowing than the Runner type

varieties. It was first believed that this problem was due to Iron or Boron deficiency in the plant. Research on this micro-nutrient deficiency problem failed to identify any particular nutrient. It should be realized that it could alternatively be a toxicity problem in the crop. Beans and Alfalfa growing on some of these soils have also shown somewhat similar symptoms of yellowing and necrosis.

FERTILIZERS AND PEANUTS

Fertilizer experiments were conducted on all the major soil groups. The data showed that there was a varietal difference in crop response to the fertilizers.

At all the locations the Tennesse Red peanut variety responded to potash applications of up to 67 kg K_2O per hectare (60 lb/acre) and phosphate of 90 kg P_2O per hectare (80 lb/acre). The only other variety responding to fertilizer was the Florigiant which gave a response to potash on the 'Red Sands' and Sandy Alluvial soils. These soils are inherently low in potash.

The general conclusion from the experiments was that the Tennesse Red was likely to respond to either potash or phosphate and that the quantities required for this crop were not high (112 kg of sulphate, or muriate or potash per hectare (100 lb/acre)).

The ground nut because of its deep rooting habit is able to exploit the deeper horizons of the soil for available nutrients and water. It is likely that a low 'booster' quantity of fertilizer before seeding may encourage early rapid root development.

The common practice in Barbados is to grow peanuts in fields which have previously grown cane. The sugar cane crop is regularly fertilized with potash and ammonium sulphate; as a result it would not be normally necessary to fertilize peanuts being grown in a succession to cane. However, if the peanuts are being grown in a field which has not been recently cultivated, then about 250–380 kg/ha (2–3 cwt/acre) of a complete fertilizer mixture should be useful. Peanuts grown on the black

(verti-sols) soils of the island show varying degrees of chlorosis depending on the variety and apparently fine moisture conditions. Experiments which involved the application of complete micro-nutrient sprays were inconclusive as to the cause of this chlorosis. There is futher need for this minor element problem in crops to be resolved since some of the other vegetable crops and Alfalfa showed similar symptoms. In experiments seeds were coated with micro-nutrients before planting, however, no significant yield differences were observed between the various treatments. There was evidence that plant chlorosis was not prevented by the micro-nutrient treatments. It is believed that the peanut chlorosis observed is closely related to the presence of soluble carbonates and soil moisture stress.

Peanut seeds were treated with *Rhizobium spp.* culture. The culture for this crop was obtained from the Nitrogen Company in the U.S.A. Nodules were observed on all the plants examined. However, there was no difference between the yields of inoculated and non-inoculated plots.

IRRIGATION

Peanuts have been grown at the Central Agronomic Research Station during the dry season by employing irrigation. The crop was irrigated about once in every eight to ten days. The amount of water applied was enough to completely wet the soil to a depth of about 22 cm (9 inches). So far no research has been carried out on the water requirements of this crop under local climatic conditions.

The crop under irrigation did not appear to be seriously affected by leaf spot diseases *(Cercospora).* However, the rust *(Puccinia)* appeared to be a little more frequent although not a serious problem.

SEED TREATMENT

At present nearly all the seeds used for planting are imported from commercial seed suppliers in the United States. The majority of these suppliers treat their seeds with fungicides and insecticides as a standard practice.

The Tennesse Red and 'local' variety are not usually treated when they are made available to the growers. The growers should in all cases treat these seeds with both a fungicide and insecticide before planting. Under local conditions untreated seeds are usually attacked by soil borne insects and fungi. Experiments carried out have shown that the untreated seeds may only give 30 to 40 percent of the germination of treated seeds. The major cause of this reduced germination was fungal attacks *(Aspergillus)* on the seeds before the embryo fully develops. There was also some damage due to ants and other insects.

Seed treatments with Ceresan, Captan and Sevin at recommended rates 3.75 g/kg (6 oz/100 lb) should therefore be carried out. Seeds must be treated with a fungicide and an insectide especially if the conditions are fairly dry and germination is expected to be delayed for any length of time.

SPACING

There is no standard field spacing for the crop in Barbados. The average spacing being used by farmers consists of 4 rows in a 1.8 metre (72 inch) wide bed with the seeds dropped at 10–15 cm (4 or 6 inches) in the row. The experiments in the Ministry have shown that having 5 rows in this bed gave higher yields per hectare. The yield per plant at the higher density per bed was the same as at the wider row spacing.

Apparently, the main limitation of altering the crop spacing is the type of planting equipment available. The farmer must however select the row spacing which is convenient for his inter-row cultivation and harvesting. Fields which will be cultivated by hand labour can easily adopt the closer seed spacing. It usually requires between 70 and 130 kg of shelled seeds per hectare (60–120 lb/acre); the seed size and row spacing being the two factors which account for this great difference in the required quantities. The manual which comes with the planting equipment will usually give information on the seeds required for various plant spacings and seed drop rates. The planting of unshelled seeds have never been widely practised in Barbados.

LAND PREPARATION

The field before planting should be ploughed, rotavated and raked. The old cane stumps if present, should be removed from the field, as these will interfere with the seeding equipment. Farmers on the verti-sols (dark colour soils) may find it useful to roll the field before planting. If fertilizers are to be applied these may be applied before rotavating or rolling. A good seed bed should be prepared before planting. After seeding and before emergence a pre-emergence weedicide should be applied over the whole area.

WEED CONTROL

The yields of peanuts are greatly reduced if adequate weed control is not achieved. Weeding the field when the crop is already well established may cause damage to the developing 'pegs', this practice should be avoided as far as possible. It is essential to use a good pre-emergence weedicide just after planting if this after cultivation is to be reduced to a minimum. Some pre-emergence weedicides can be applied as late as the soil 'cracking' stage, which usually occurs about 5–7 days after planting.

Several weedicides have been tested for peanuts under local growing conditions. The effectiveness of all the weedicides was greatly influenced by the soil moisture conditions. All weedicides were more effective if the soil was moist at the time of spraying or if the soil was wetted within the few hours after spraying.

During 1969 to 1971 'Amiben' gave the best control of a wide range of weeds. Other commercial products such as 'Alanap' and 'Dynap' gave fairly good control at some locations.

In the St. Philip area where nut grass *(Cyperus rotundus)* is a serious major weed problem, all the chemicals tried were ineffective. Under these weed conditions 'Balan' (Benefin) (Vernam) (Vernolate) and mixtures of these chemicals with 'Dinitro' were tried in some fields. These mixtures were sprayed on the fields after ploughing and about one hour before the fields were rotavated. The sprays all failed to give good control

of the nut grass at the different locations. The severe dry period which followed spraying may have been an important contributing factor to their ineffectiveness. There is a need locally for equipment which can do a more effective soil injection treatment with these various chemicals.

The product 'Premerge' (Dinitron) as a post emergence directed spray between the rows, gave some control of the weeds late in the growing season. The use of a 4 row inter-row cultivator between the nuts caused damage to the plants. The modification of the 4 row inter-row cultivator on to a two row bar was carried out by Mr. Henderson Williams of the Ministry of Agriculture. Trials with this "two row weeder" have been very successful in the young peanut crop at Graeme Hall. If weed competition late in the growing season is high, then it is usually more advantageous to hand weed the nuts, than to allow the weed growth to persist.

Research work on weedicides for peanuts is being carried out both in Barbados and in Jamaica. It is expected shortly that a wider range of chemicals will be recommended to our farmers.

DISEASES

The varieties now being grown in Barbados have not been selected for resistance to any particular disease or pest. It is likely that in future varietal selection programmes, consideration will have to be given to pests and diseases. These two factors do not at present limit yields of this crop in Barbados.

Seeds and pods which are improperly dried and kept in storage, or planted without a fungicide treatment, are likely to be attacked by soil borne molds (*Asperguillus spp*). These molds grow on the pods and testa giving the seeds a blueish grey appearance. These molds (*Asperguillus niger*) can also attack the germinating seedlings causing the wilting and death of the seedlings (Crown rot). Damage to seeds and seedlings have so far not been a serious production problem. Seeds for planting should be treated with a fungicide. It is possible to treat the seeds with a systemic fungicide (Benlate) to reduce mold attacks on the young seedlings.

The growing plants are likely to be attacked by one of the *Cercospora* leaf spot diseases. The disease is likely to occur if there are successive rainy or very humid days, and usually when the foliage is fairly dense. The spots may appear first as pale linear streaks, which become more yellow as they develop. The spots finally become dark brown and rounded when fully developed. Spraying should begin when the first streak appears on the leaves. Further research on the control of *Cercospora* leaf spot is presently being undertaken by the Pathology Unit of the Ministry of Agriculture.

The Pathology Unit of the Ministry of Agriculture has been conducting trials on the control of peanut rust *(Puccinia arachidis).* This disease is not locally a major problem of production, however, it seems to occur to some extent in all the growing areas of the Island. The rust appears on the leaf as a brown raised spot which when severe can cause leaf fall. Previously there were no standard recommended chemical control methods for this disease; it is likely that the new systematic and organic fungicides may provide some good control.

PESTS

The corn Earworm has so far caused the most damage to the peanut crop. This light green colour caterpillar (moth larval stage) feeds on the leaves, causing considerable leaf loss. These larvae may spend 14–21 days of their 30-day life cycle in this stage. This offers not only a good opportunity for considerable crop damage but also facilitates chemical control of the pest.

In addition, there are several other caterpillars which attack the peanut foliage. Frequent field inspection and prompt spraying can reduce the problems caused by these leaf eating pests.

The sucking insects Aphids and Thrips have not been, so far, significant pests of this crop. It seems likely that as the acreage increases, there will be a greater frequency and incidence of attacks by these and other pests.

TIME OF PLANTING

Rainfall is the factor which determines the time of planting of the crop. The crop has to be planted at such a time that rain and high soil moisture conditions late in the growing season do not hinder the timely harvest of the crop. Also the seeds must be planted when there is sufficient moisture available to allow the rapid germination of the seeds.

Seeds which were planted during a dry spell survived for six weeks, after which they germinated when the soil moisture conditions were adequate. Seeds which remain in the soil for long periods before germinating are likely to suffer temperature and insect damage in the soil. Under dry conditions seeds may survive better if planted at 5 cms (2 inches) depth in the soil, where the temperature is not as high as within the top 2.5 cms (inch) of the soil. However, if seeds are planted at this depth and heavy rainfall should follow planting, the seeds may be further covered over and as a result could suffer from inadequate aeration for germination.

Timing of planting should also allow for a fairly high soil moisture level during the first month of the growing cycle when the root system is not yet extensive.

PLANTING

The two Row American type 'Row Crop' planted has been used in most cases to plant the peanut crop. The 'Stanhay' precision planter was slightly modified and used to plant the smaller size seeds (Tennessc Red). These modifications were insufficient for this planter to plant the larger size seeds (Florigiant and Local variety).

The difficulty of using the planters presently available is that it is difficult to obtain a row spacing less than 30 cms (1 foot) between rows. However, if the closer 5 row per bed spacing is desired it would be necessary to plant part of the crop by hand.

The other major pests of peanuts in Barbados are Rodents. These cause considerable damage to peanuts in storage, eating both treated and untreated nuts.

SPRAYING

Many of the local farmers are aware of the effectiveness of insecticides and fungicides in controlling the various pests and diseases. Few farmers, however, seem to realize that the timeliness of applying a spray treatment will most often reduce the frequency or number of times this spray will have to be applied. Spraying a crop at the right time can help to reduce the cost of crop protection. Peanut growers should make frequent inspections of all their fields. They should pay particular attention to the new leaves for the appearance of disease spots or insect eggs. At the first sign of pest or disease the required spray treatment should be ascertained from the Agricultural Extension Service of the Ministry of Agriculture. Spraying should begin within 24 hours after the first sign of attack. Farmers should not wait until the Extension Officer comes to inspect the crop.

Farmers should not continue the spraying on a routine cycle basis, but should rather continue the field inspection cycle and spray only when a new attack seems likely. Although spraying on a routine cycle gives good assurance of freedom from attack, it can most often be unnecessary, costly and wasteful.

SPRAY CHEMICALS

The most common products used for the control of fungal diseases are the Copper and Zinc base fungicides. Common among these products are Ceresan, Captan, Cupravit and Zineb. Lately the organic non-copper product 'Antracol' is being used with a wide range of crops. 'Benlate' which is a systematic fungicide is probably the most widely used of all the locally available products. Although expensive, this product seems to give very good control for most fungal diseases of the vegetable crops being grown.

The large farms with tractor mounted equipment generally use DDT (Toxophene Metacystox) and Malathion to control the insects in their

peanut crops. However, products such as Perfecthion and Foliothion have been used in the *Ultra Low* Volume (ULV) sprayers for the smaller and more widely separated plots. The ULV sprayers seem to be more effective than the other spraying equipment.

Fields have also been periodically sprayed with 'Lannate' or 'Rogor 90'. These chemicals are effective in the control of Thrips and Aphids. It is also likely that pods and seeds attacks by soil borne insects could be reduced by these systematic sprays.

HARVESTING

In the areas of the Red-yellow soils near Victoria, St. John, the Alluvial sandy soils in the flat areas of St. Andrew and the Red sandy clays of St. James and St. Peter, peanuts can be easily and completely harvested by the 'digger shaker' and peanut combine equipment.

In areas of the heavier verti-sols (Black soils), the stickiness and high water holding capacity of the soils do not allow the blocks to shatter or easily fall away from the pods. In order to overcome this difficulty, some farmers have partially lifted the vines from the ground using the blade of the 'digger shaker' equipment to undercut the plants. The plants are then finally pulled out of the soil by hand. Fewer nuts are lost in the soil if the hand lifting is completed as soon as possible after under-cutting the plants. The plants after being pulled out of the ground are wind-rowed and dried. There can be a high loss of nuts at this stage resulting from praedial larceny. After drying, the nuts can be picked by the combine as it moves along the 'Wind-row'.

Instead of wind-rowing, the plants could be placed to dry in 120 or 150 cm (4 or 5 ft) high stacks, so that the pods are exposed to the outside of the stacks. If this method of drying is used, it is better to have the nuts stacked on a frame which is raised about 30 cm (1 foot) above the surface of the ground. If such a frame is not provided, it is noticeable that plants in contact with, and near the soil surface, remain moist and encourage pests.

Precipitation which occurs during the wind-rowing or stacking phase, helps to clean the pods; seldom at this time of the year are showers persistent enough to interfere with drying. Stacked plants can be hand fed into the combine when dry. In this way the amount of extraneous matter from the field which gets into the combine is reduced.

In spite of the method used to dry the plants, it is essential that there is as little soil as possible adhering to the pods. Soil which collects in the conveyor system of the combine will eventually choke the system. This choking results in a great wastage of time during harvesting to clear and clean the equipment.

DRYING

The harvested peanuts can be further dried after removal from the vines. It is convenient and cheap to sun-dry the nuts in trays with wire mesh bottoms. These trays can be easily built by most farmers. Some farmers may prefer to dry their nuts on bags or tarpaulins placed on the ground in the open.

Raking the nuts during sun-drying helps to remove most of the adhering soil particles from the pods. If the nuts are on trays these particles easily fall through the mesh leaving the nuts comparatively free of foreign matter. Raking once a day is usually sufficient for cleaning the nuts. Proper drying of the nuts allows the seeds to develop a better flavour and eating quality. Peanuts will lose about 40% of their wet weight after the nuts have been properly dried.

Facilities are available which could be adapted for artificially drying peanuts. This method of drying needs carefully controlled conditions of temperature and humidity. Farmers should not attempt this method without some further technical help from the Ministry of Agriculture.

STORAGE

The major part of the crop is sold soon after harvest and few farmers have been faced with the problems of having to store their crop for any length of time. Peanuts are one of the few crops which can be

stored under local climatic conditions. There is no necessity to create an artificial environment for storing the nuts. Farmers who find it necessary to store part of their harvest, must provide space that is well protected against Rodents. The unshelled peanuts can be stored on concrete floors or in bags in rooms which can be maintained rodent free. Few insects will attack well dried unshelled nuts, and seldom is an insecticide (usually Lindane) treatment necessary. The use of systematic insecticides (Lannate Rogor 90) during the growing cycle will reduce the number of nut pods which are insect attacked before harvest. Nuts which are to be kept in storage should have less than 11% moisture in the pods, if the keeping quality is to be maintained.

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