

TABLE IV

The proportion of growing shoots in and mean extension growth made by leader shoots of *Neelum* that shed flowers early and those that carried fruits to maturity.

Class of Shoot.	Number tagged.	Number producing laterals.	Percentage.	Total mean extension growth for the year (Cm.)
Shoots that shed flowers early	75	54	72	14.54
Shoots that carried fruits to maturity	41	8	20	1.04

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Groundnut as Human Food.*

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Food constituents. The food-stuffs that we consume should contain the right amount and kind of proteins, fats, carbohydrates, vitamins and mineral salts, if we are to live in normal health and our body is to function properly. Each of these ingredients supplies some requirement or other of the body complex. Proteins are necessary for building the muscles; carbohydrates are the body's chief source of energy; fat is the heat producer while mineral salts and vitamins play an important part in the physiological functions. Any one food-stuff that is available to man may not contain all the above ingredients, so that by consuming one particular product we cannot supply the full requirements of the body. Therefore, we must combine them judiciously so that our daily diet contains all these essential ingredients in the right proportions.

The South Indian diet. The South Indian diet which usually consists of a large quantity of highly polished rice and only very small quantities of *dhal*, grams, vegetables, milk, etc., is rich only in carbohydrates. It is deficient in other requirements of the body, especially proteins which are so essential for muscle building. To remedy this defect we have to include in our rice diet adequate quantities of other food-stuffs that supply these deficiencies but at the same time are cheap and within easy reach of even the poor.

Food value of groundnuts. Groundnut which is produced in abundance in our Province is widely acknowledged as a rich and cheap source

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of vegetable protein and if included in our daily diet will supply the protein deficiency economically. The table given below compares groundnuts with some of the common protein foods.

Food value of some common protein foods.

	Percentages.			Calorific value.
	Protein.	Carbo-hydrates.	Fat.	
Milk (Cows')	3.3	4.8	3.6	65
Eggs (Fowl)	13.3	...	13.3	173
Mutton	18.5	...	13.3	194
Beef	22.6	...	2.6	114
Redgram (<i>dhal</i>)	22.3	57.2	1.7	333
Groundnut	25—33	10—20	40—50	500—600

It may be seen that the protein content of one ounce of roasted groundnut is nearly as much as that of $1\frac{1}{3}$ oz. of *dhal*, $1\frac{2}{3}$ oz. of mutton, $2\frac{1}{2}$ oz. of eggs, or 8 oz. of milk. On the basis of protein content alone, to secure that amount of protein which is contained in one anna worth of groundnuts, one will have to spend about 3 annas for *dhal*, $4\frac{1}{2}$ annas for mutton, 10 annas for eggs, and 12 annas for milk. These show clearly that groundnut is a rich and cheap source of protein.

Nutrition experts state that "groundnut is also rich in phosphorus, and contains some of the B vitamins, notably B₁ and an important member of the B₂ group, nicotinic acid, in fair amounts. Its high fat content makes it a concentrated food with a high caloric yield per unit of weight. In the case of the under-as well as mal-nourished, any supplement which increases their total food intake would be of value."

However, it would be difficult to take groundnut as the principal ingredient in the diet. Eaten in large quantities, it tends to be nauseating, probably due to the high oil content. This can be overcome by eating it in smaller quantities and preferably mixed with jaggery or cereal foods. Cooking or artificial grinding is said to increase its digestibility.

Consumption in India. Even though groundnut is recognised as a palatable "poor man's nut", and is eaten and relished by almost all classes of people, its consumption in India has not kept pace with the increase in its production. This is chiefly due to the fact that there is no organised agency for the regular supply of edible groundnuts or for processing it for consumption. At present it is eaten only casually whenever it becomes available and that mostly as raw or roasted groundnuts. The *per capita* consumption of groundnuts in India is estimated to be about $\frac{3}{4}$ lb. of kernels. This is almost negligible when compared to the consumption of groundnuts elsewhere, particularly in the U. S. A. where it has become a regular article of diet and forms a popular item in the daily menu of American homes.

Factories for grading and processing groundnut for edible purposes have sprung up in many parts of America. A large quantity of groundnut is consumed in the roasted form or as "salted peanuts", "peanut butter", "peanut candies", "peanut brittle", etc. Of these "peanut butter" has become a regular article of consumption and is produced on a factory scale and marketed.

Likewise the consumption in India can be increased to the advantage of both the consumer and producer alike. Below are given a few methods of preparing groundnut for consumption in Indian homes which may satisfy the varied tastes. Most of them, particularly the Indian recipes, are familiar to many, and simple and easy to prepare.

Indian Recipes.

1. *Groundnut chundal.*

1 Madras measure freshly harvested groundnut pods	1 spoonful mustard
2 spoonfuls salt	3 or 4 dry chillies and a few curry leaves
$\frac{1}{2}$ ollock oil	

Wash the pods well and boil in salted water till the kernels are well cooked. Drain off the water and remove the shells. Pour oil in a pan, add mustard, chillies and curry leaves. When fried add the cooked kernels, fry for a few minutes and remove.

✓ 2. *Salted groundnuts.*

$\frac{1}{2}$ Madras measure groundnuts (kernels)	
1 ollock oil.	A little salt

Slightly roast the groundnuts over a slow fire, remove skin. Have the oil well-heated in a pan. Fry the kernels a handful at a time. Spread on a piece of paper so as to remove extra oil. Sprinkle with salt and serve. If desired a little chilli powder may be added with the salt.

✓ 3. *Groundnut mixture.*

1 cup blanched* groundnuts	$\frac{1}{4}$ cup copra chips
$\frac{1}{2}$ cup roasted Bengalgram (<i>kadalai</i>)	$\frac{1}{2}$ ollock oil
$\frac{1}{4}$ cup roasted greengram	A little salt and chilli powder
$\frac{1}{4}$ cup fried rice	

Pour oil into pan, heat, add the blanched kernels first and then the other ingredients. Add chilli powder and salt. Mix well, remove and serve.

4. *Groundnut chutney.*

$\frac{1}{2}$ cup blanched groundnuts	A little asafoetida
8 chillies	Coriander leaves
2 spoons coconut scraped	Salt
A little tamarind	

Slightly roast the chillies, asafoetida and coriander leaves. Grind all the ingredients together and serve with *iddali* or *dhosai*.

* Blanching groundnuts is done by roasting the kernels and removing the coloured seed coat by rubbing, and also the tiny bud (germ).

5. *Groundnut pakoda.*

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|---|--------------------------|
| 1 cup groundnuts slightly roasted
and blanched | 1 Oilock oil |
| 2 table-spoons Bengalgram flour | A pinch of chilli powder |
| 1 table-spoon rice flour | Salt |

Mix the Bengalgram and rice flour. Add a little salt and chilli powder and make into a frying batter adding water. Heat the oil in a vessel and when well-heated, put in the groundnuts after first dipping them in the batter. Fry to a golden brown, drain and put on a piece of paper to remove the extra oil; serve hot.

✓ 6. *Groundnut toffee.*

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|--------------------------|------------------------------|
| 1 lb. groundnut blanched | 1 table-spoon ghee or butter |
| 1½ lb. jaggery | 1 cup water |

Melt the jaggery in a deep pan adding the water. Allow to boil and then simmer stirring occasionally. When the syrup is ready i. e., when a little dropped in water hardens, add the butter or ghee and nuts stirring well. Turn the mixture at once into well-greased pans and cut into squares while hot.

✓ 7. *Groundnut toffee (another method).*

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|--------------------------|--------------------------------|
| 1 lb. groundnut blanched | ½ cup copra chips if available |
| 1 cup roasted rice flour | 1½ cups water |

Melt the jaggery with the water in a deep pan. Bring it to the boil and let it go on simmering until a little hardens when dropped in cold water. Add the groundnut, rice flour and copra chips stirring well. Spread the mixture in well-greased plates and cut into squares while hot.

✓ 8. *Groundnut balls.*

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|---------------------------------|----------------------------------|
| 2 cups groundnut blanched | 1 cup gingelly seeds cleaned and |
| 1 cup roasted <i>ragi</i> flour | 1 lb. jaggery [roasted] |

Pound the jaggery in a mortar. Add the groundnuts and pound well. Next add the roasted gingelly seeds and *ragi* flour and pound thoroughly. Make this into small balls and keep for use.

American Recipes.*1. *Peanut soup.*

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|----------------------|-----------------------|
| 1 quart milk | 2 table-spoons butter |
| 2 table-spoons flour | 1 cup peanuts |

Cook peanuts until soft; remove skins, mash or grind until very fine; let milk come to a boil; add the peanuts, cook 20 minutes. Rub flour into a smooth paste with milk; add butter to the peanuts and milk; stir in flour; season with salt and pepper to taste; serve hot.

* Extracted from a bulletin entitled "How to grow the peanut and 105 ways of preparing it for human consumption" by George W. Garner, published by the Experimental Station, Tuskegee. Normal and Industrial Institute, Alabama, U. S. A.

Note. Unless designated otherwise, the groundnuts used should be blanched. Blanching is done by roasting the kernels and removing the coloured seed-coat by rubbing and also the tiny bud or germ inside.

2. *Peanut tarts.*

2 cups flour	$\frac{1}{2}$ cup milk
$\frac{1}{2}$ cup sugar	2 table-spoons butter
1 cup coarsely chopped peanuts	1 table-spoon baking powder
1 egg	Pinch of salt

Sift flour, salt, and baking powder into a bowl; rub in the butter, nuts and sugar; mix to a rather stiff dough with the egg and milk; turn on to a floured board, and roll out two-thirds of an inch thick; cut into bars of convenient size, and fry in the fat until golden brown.

✓ 3. *Peanut wafers.*

1 cup flour	1 cup sugar
$\frac{1}{4}$ cup butter	1 egg
1 cup blanched nuts	

Grind or roll the nuts; stir into butter; drop on buttered tins, and bake quickly.

4. *Peanut muffins.*

$\frac{1}{2}$ cup chopped peanuts	$\frac{1}{2}$ pint thick sour butter-milk
2 eggs, beaten very light	$\frac{1}{2}$ tea-spoon salt
$\frac{1}{2}$ tea-spoon soda, dissolved in a table-spoon of water	$\frac{1}{2}$ cup flour, or enough to make a stiff batter.

Add soda to the sour milk; stir well; make the batter quickly; when ready to drop into the pans add peanuts; bake in a quick oven from 20 to 25 minutes.

5. *Peanut doughnuts.*

2 eggs, beaten light	1 salt-spoon salt
1 cup sugar	1 salt-spoon cinnamon
1 cup sour milk	3 table-spoons melted butter
$\frac{1}{2}$ tea-spoon soda	1 cup finely ground or chopped peanuts
4 cups flour	

Into the well-beaten eggs stir the sugar, butter, milk and nuts; add flour to make a dough just stiff enough to roll out; roll, cut out and fry in deep fat hot enough for the dough to rise at once.

6. *Peanut cake.*

$\frac{1}{4}$ lb. butter	4 eggs (whites only), well beaten
2 cups flour	$\frac{3}{4}$ cup water
1 cup finely ground peanuts	1 tea-spoon baking powder

Beat the sugar and butter to a cream; add the water and flour; stir until smooth; add half the well-beaten whites, then the nuts, then the remainder of the whites and the baking powder; pour into square, flat pans lined with greased paper to a depth of three inches, and bake in a moderate oven for 45 or 50 minutes.

7. *Peanut cake.*

9 ounces flour	1 tea-spoon vanilla
4 ounces butter	$\frac{1}{4}$ tea-spoon salt

4 eggs
4 ounces chopped peanuts

1 tea-spoon baking powder

Sift flour, salt and baking powder together; cream the butter and sugar; add the vanilla, chopped nuts, yolks of eggs well beaten; add flour, then whipped whites, and beat well; bake in shallow pan in medium oven; when cold, ice with boiling icing.

8. *Peanut and cheese roast.*

1 cup grated cheese
1 cup bread crumbs
1 tea-spoon chopped onion
1 cup finely ground peanuts

1 table-spoon butter

Juice of half a lemon

Salt and pepper to taste

Cook the onion in the butter and a little water until it is tender. Mix the other ingredients, and moisten with water, using the water in which the onion has been cooked. Pour into a shallow baking dish, and brown in oven.

9. *Peanut omelet.* Cream a slice of bread in half a cup of rich milk; beat the whites and yolks of two eggs separately; add the yolks to the bread crumbs and milk; to half a cup of finely ground peanuts add a dash of pepper and salt; mix thoroughly; fold in the whites, and cook as usual in a buttered pan.

10. *Peanut macaroni and cheese.*

1 cup broken macaroni
1 cup rich milk
2 table-spoons flour
2 quarts boiling salted water

1 cup coarsely ground peanuts

$\frac{1}{4}$ to $\frac{1}{2}$ pound cheese

$\frac{1}{2}$ tea-spoon salt

A dash of cayenne pepper

Cook macaroni in the boiling salted water; drain in a strainer, and pour cold water over it to keep the pieces from sticking together; mince cheese, and mix with all other ingredients except macaroni; put sauce and macaroni in alternate layers in well buttered baking dish; cover with butter crumbs, and bake slowly until crumbs are brown.

11. *Peanuts and mushrooms.* Cook 2 table-spoons of chopped onion and $\frac{1}{2}$ cup chopped fresh mushrooms in 4 table-spoons of butter for five or six minutes; stir in 2 table-spoons flour, a little salt and pepper, and $1\frac{1}{2}$ cups milk; cook and stir a while for five minutes longer; then add one cup of finely chopped peanuts; reheat and boil slowly for 10 minutes; serve on squares of buttered toast.

12. *Peanut Timbales.*

$\frac{1}{2}$ pint of peanuts cooked until soft in salted water; drain and mash
2 well beaten eggs and two cups thin cream, added to the nuts.
 $\frac{1}{2}$ tea-spoon of salt, and a dash of pepper.

Turn into custard cups; put the cups in a basin; surround them with boiling water; cover the tops with buttered paper, and bake in a moderate oven for 20 or 25 minutes; then mould and serve with a little cream sauce poured around them.

✓ 13. *Peanut butter.* Shell the peanuts; roast just enough so that the hulls will slip off easily; remove all the hulls by gently rolling, fanning and screening; grind very fine in any sort of mill, passing through several times if necessary; pack in cans, bottles, or jars, and seal if not for immediate use. Some manufacturers add a little salt and a small amount of olive oil; others do not, according to taste. For small quantities of butter a good meat grinder will answer the purpose. If the nuts are ground fine enough no additional oil will be necessary.

✓ 14. *Salted peanuts.* Roast the peanuts; shell and remove the thin hulls, put in a pan; butter slightly; put in oven and heat through; spread on piece of white paper, sprinkle with fine salt and serve.

Note.— If the nuts are very greasy allow them to drain before applying the salt.

✓ 15. *Peanut butter sandwiches.* Roast the desired number of peanuts; rub the thin hull off the nuts, grind or rub in a mortar until quite smooth and oily; salt to taste, and spread a thin layer between crackers, lunch biscuits, rolls or bread of that character. If the butter is not as thin as you wish, add a little fresh cow's butter, a little milk or water and rub well. This butter will not keep as well as when the milk or butter is left out.

16. *Peanut salad.*

1 small cabbage	1 cup vinegar
1 tea-spoon flour	1 tea-spoon butter
1 tea-spoon mustard	$\frac{1}{2}$ tea-spoon pepper
1 tea-spoon sugar	2 eggs
1 pint peanuts	2 tea-spoons salt

Chop cabbage and peanuts up fine; add the salt and pepper; cream the butter, mustard, sugar, and flour together; stir in the vinegar; cook in double boiler until stiff; add yolks of eggs; pour over nuts and cabbage, and serve.

17. *Peanut icecream.*

1 pint peanuts	1 pint cream
2 quarts milk	3 eggs
2 cups sugar	2 tea-spoons vanilla

Roast, shell, and roll the peanuts until they are quite fine; brown one cup of sugar and add to the milk; next add the remainder of sugar, the cream, vanilla, and lastly the peanuts; freeze.

✓ 18. *Peanut butter condy.*

2 cups sugar	$\frac{1}{2}$ cup milk
2 table-spoons peanut butter	

Blend together, boil for five minutes; remove from the fire and beat steadily until cool.

✓ 19. *Peanut candy.*

2 cups sugar	1 cup peanuts
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Melt the sugar in a frying pan; melt slowly, stirring constantly until melted

butter a shallow dish, and cover bottom with the roasted and cleaned nuts; pour the candy over them; set aside; when cool break in pieces, and serve.

✓ 20. *Peanut caramels*

1 cup sugar	1 cup butter
1 cup molasses	1 cup milk or cream
1 cup peanuts (ground)	

Cream sugar and butter; add molasses and cream or milk, stirring constantly; put mixture into a boiler and let boil, gently scraping the bottom to prevent burning (do not stir); let cook until it forms a soft mass when dropped into cool water; add peanuts and pour into buttered tins. The layer should not be more than $\frac{1}{2}$ an inch thick. Then cool enough, cut into small squares, and wrap in thin glazed paper.

✓ 21. *Peanut butter fudge.*

2 cups powdered sugar	2 heaped tea-spoons peanut
1 cup milk	butter.

Mix ingredients; boil vigorously for five minutes; beat; pour in a buttered pan, and cut in squares.

✓ 22. *Peanut brittle.*

1 cup roasted peanuts	3 cups granulated sugar
$\frac{1}{4}$ tea-spoon soda	1 scant cup boiling water

Melt all together over a slow fire; cook gently without stirring until a little hardens when dropped in cold water, add the nuts; turn the mixture in well buttered pans and cut while hot. Stirring will cause the syrup to sugar.

23. *Peanut and pop corn balls.*

$\frac{1}{2}$ tea-spoon soda	1 quart freshly roasted peanuts
1 pint syrup	2 table-spoons butter
3 quarts freshly roasted corn	1 tea-spoon vinegar

Cook until the syrup hardens when a little is dropped in cold water; remove to back of stove; add the soda dissolved in a tea-spoon of hot water; pour syrup over the corn and nuts, stirring until each kernel is well-coated; mould into balls.

✓ 24. *Peanut almond fudge.*

1 $\frac{1}{2}$ cups sugar	1 table-spoon almond extract
1 cup milk	1 cup peanuts deeply browned but
1 table-spoon butter	not scorched; crush or grind

Brown $\frac{1}{2}$ cup sugar in a pan; add the milk; when the brown sugar is thoroughly dissolved add one cup of granulated sugar and the butter; boil to the soft-ball stage; flavour with the extract; add the peanuts; beat until creamy; pour into buttered tins, and mark off into squares.

25. *Peanut puffs.*

1 cup cream	1 egg (white)
3 cups sugar	1 cup ground peanuts
$\frac{1}{4}$ cup honey	

Boil the cream and sugar (without stirring) until the threading stage is reached; add the honey; when syrup will make a soft-ball when dropped into cold water, remove from the fire and beat into it the well-whipped white of an egg; add the nut-meats; when firm and creamy whip into balls.

26. *Peanut carrot fudge.*

1 cup carrot pulp	1 table-spoon butter
1 cup corn syrup	1 lemon
2 cups sugar	1 orange
$\frac{1}{2}$ cup peanut meal	1 tea-spoon vanilla or almond extract

Bake some nice, yellow carrots until tender; pass through a sieve; to a cupful of this pulp, add all the ingredients except the extract; pour into buttered pans, and when cool cut into cubes; use both the juice and half the grated peel of the lemon and orange.

✓ 27. *Peanut coffee.*

$\frac{1}{2}$ cup peanuts	$\frac{1}{2}$ cup wheat
$\frac{1}{2}$ cup cowpeas	

Roast all to a rich coffee brown, grind and make as for postum. To those who like a cereal coffee, this will be quite acceptable, even delicious. To more or less habitual coffee drinkers, one-third or one half real coffee will make the above recipe more acceptable.

✓ 28. *Salted peanuts.* Parch, rub and winnow out the brown hulls; put in pan with just a speck of butter; heat gently, shaking all the time; when buttered sprinkle with fine salt.

Note. The above recipes are only a few of the many ways in which this wholesome nut can be prepared for human consumption.

Maintenance of Purity of *Cumbu* Strains under Large Scale Seed Multiplications. ✓

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In no phase of agriculture there is greater need for careful planning than in the maintenance of the purity of the improved strains of crops during the course of their multiplication and distribution. It is more so in the case of crops which are mainly cross-fertilized. The criterion of the methods adopted should be such as to combine minimum cost with efficiency in ensuring against cross-fertilization with other varieties. Otherwise, costly methods of selfing followed in the seed nucleus plots would soar to a staggering amount when adopted for large scale seed farms. Lack of cheap and suitable methods for protecting the purity of the crop have all along proved a serious handicap for the rapid spread of high yielding *cumbu* strains in the black soils of the Tinnevelly District.

Cumbu flowers being protogynous are easily susceptible to out-crossing. Due to this feature of out-crossing with local inferior varieties the