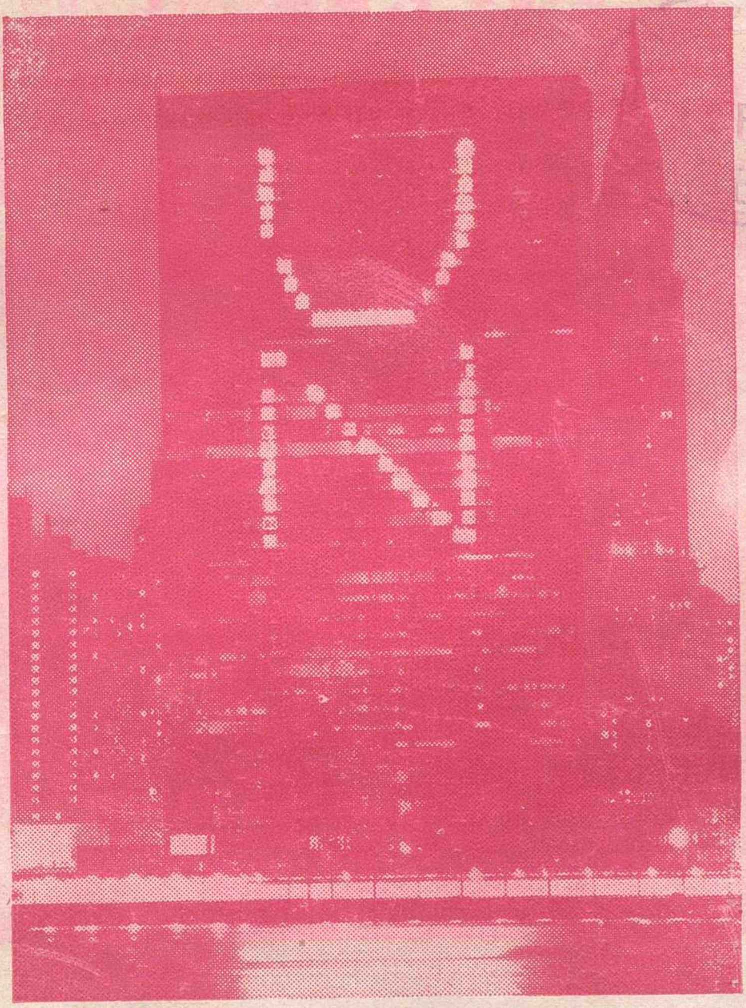
FACT

The Magazine of Fertilisers And Chemicals, Travancore Ltd.
Vol. 5. No. 7. January 1951.

Editor & Publisher: P. Sreedharan Pillai B. A.

FEB 1951
DRAS



The New United Nations Secretariat Building in New York City, with office lights specially arranged in the letters U. and N.

Cauli-flower F. A. C. T. Experimental Garden.

12 FEB 1951
MADRAS

FACT

Vol. 5 No. 7
January 1951

Editorial Board:

Sri. Paul Pothen.
,, T. S. Ramakrishnan
,, A. Ramakrishna Iyer
,, M. C. Varghese
,, K. A. Menon
,, P. Sreedharan Pillai

The Editorial Board do not hold themselves responsible for the views expressed by contributors.

Books and Pamphlets on scientific, industrial and allied themes are accepted for review in this Journal.

Editor.

In this Issue ....

FIVE REASONS WHY YOU SHOULD ADVERTISE IN

FACT

- It is a monthly dealing with the know-how of Agricultural and Food Production Problems of the Day.
- It circulates throughout INDIA.
- It is published punctually on the 25th of every month.
- It has the Lowest Advertisement Tariff among Journals of the same Vogue and Class.
- It is in a position to give Expert Advice (free of charge) on correct and effective Layouts.

A casual Trial will convince you.

ADVERTISEMENT TARIFF

COVER POSITIONS:

		FULL PAGE	HALF PAGE
FIRST COVER	(Inside)	Rs. 100/-	Rs. 60/-
LAST COVER	(Inside)	Rs. 90/-	Rs. 50/-
LAST COVER	(Inside)	Rs. 120/	

GENERAL POSITIONS:

FULL PAGE	Rs. 60/-
HALF PAGE	Rs. 35/-
QUARTER PAGE	Rs. 18/-

20% REDUCTION FOR ADVERTISEMENTS ON CONTRACT BASIS FOR A MINIMUM OF TWELVE INSERTIONS.

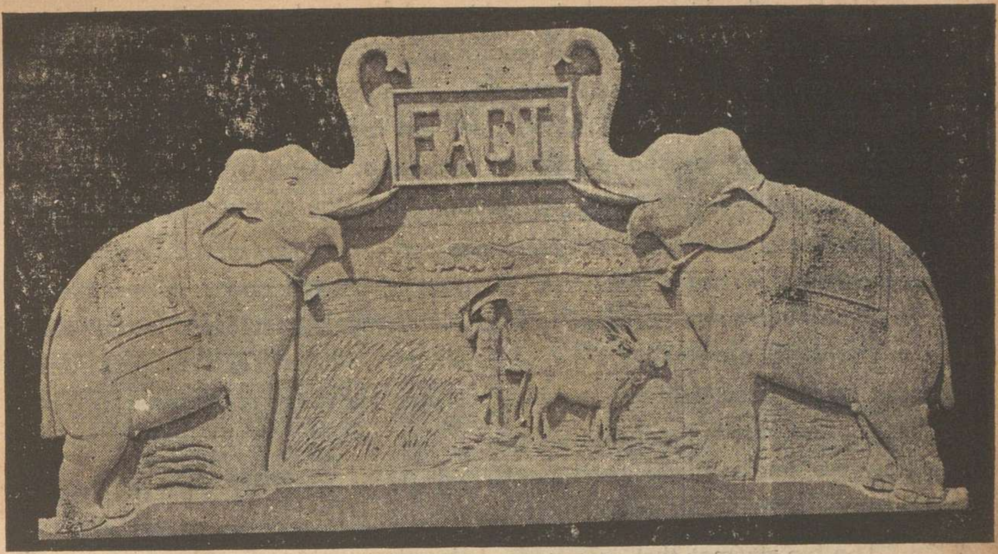
MECHANICAL DETAILS

One Page — 2 colums × 8 inches = 16 inches
Width of Type column — 2¼ inches
Length of Type column – 8 inches

HALF-TONE AND LINE BLOCKS ACCEPTED

For details please write to:

The Editor,
FACT, Alwaye.



VOL. 5 | JANUARY 1951 | NO. 7

UNIVERSITY LIBRARY
12 FEB 1951
MADRAS

EDITORIAL.

ONE YEAR A REPUBLIC.

ON the 26th of this month India completes one year of life as a Republic. Though in the life of a nation one year is not a considerable period, yet, it affords us occasion to look back and make an assessment of our gains and losses.

India under British Rule was merely an adjunct of a big power; it had no separate individual existence as a distinct state. It was small wonder therefore that she lagged far behind the other countries of the world in the spheres of Industrial development and economic stability. Even her very policies in respect of matters affecting her welfare and self-sufficiency had to be shaped and formulated with due regard to the interests and world commitments of the governing Foreign Power.

She was drained of her valuable raw materials for want of facilities to get them converted into useful articles of trade here itself, and had to depend on imports from other countries, even to meet her very moderate requirements. The absence of a go-ahead outlook and definite plans for irrigation, agricultural expansion, scientific cultivation and so forth, had tended to deplete and impoverish the soil, which was being cultivated for the last two thousand years without any change or improvement according to the same stereo-typed system. The result was that the average farmer found it a very unremunerative proposition to carry on his heredity occupation, and left it at that. These and other controlable reasons caused occasional famines, at one or other part of this vast country, upsetting the peace and economic balance of the whole people.

But the acquisition of Independence and the control of the destinies of the country by the chosen leaders of the people, brought about a remarkable change not only in the attitude of the people themselves, but also in the attitude of the world external to India, with whom we have necessarily to deal, not only for our essential requirements, but also for their recognition of our legitimate place among the free nations of the world. It is interesting to note how we employed the slender resources at our command with the best effect for furthering these objects in view.

The big attempt that was made during the year by the Government of India for improving the problems of industrial, agricultural and economic, requirements of the country consisted in the appointment of the National Planning Commission. Embracing as it does our best experts in various lines of scientific research, industrial organisation and financial acumen, including our Prime Minister Sri. Jawaharlal Nehru, the Commission's findings are bound to be of the greatest help and guidance to us by and by.

It is also an undoubted fact that the prestige as well as the credit of our country have risen among the other nations of the world as a result of our earnest diplomatic activities with a view to bringing peace and contentment among the forces of conflict, suspicion and mutual distrust. It is certainly no small part that India has played in the counsels of the United Nations for cementing together that body into a cohesive and single force to stand up against war and aggression and to make a determined effort for World Peace.

In the matter of internal administration also, India was able, during the year, to unify and consolidate the different discordant groups, give herself a foolproof and completely secular constitution, put down tendencies of a strictly subversive and anti-social character, and establish a sense of stability and security so vital for the plans of progress and development.

Of course, it is the bounden duty of every citizen of India to work unremittingly and to the utmost of his capacity for implementing the various schemes and programmes adopted by our government from time to time and to be ever vigilant and watchful not only to preserve our hardwon Independence intact, but also strive hard to attain self-sufficiency in food, clothing and other essentials of life. so that before long we may reach our objective, namely that of a "Welfare state."

EXPANSION OF PRODUCTION

By

A. V. MATTHEW B. A., B. L.

THERE is always a noble purpose in the constructive methods of produc.ion which brings to fruition the cre.tive potentialities of men in the form of an economic sys'em, the sphere of which is continuously spreading in new directions, the issues regarding which have often shaped the history of nations and the progress of which involves varying degrees of co-operation according to the willingness of the co-operative bodies at any given time and place.

Any same economic view which in modern times can be regarded as adequate must allow for the fact of producrive efficiency to which an intimate relation is sustained by all progressive agricultural and industrial activities. We have in consequence a new realisation of the importance of productive efficiency and of its capacity to serve economically progressive ends Our time and our country demand productive efficiency as never before.

Every nation has a right to acquire such control over its economic policy as would make each branch of the production conform to the interests of the nation as a whole; and for maintaining such an ideal policy, it is necessary to eliminate all the factors that militate against it. In the attempt to effect a fairer distribution of wealth, both the government and the people must see that the economy of the country is not thereby rudely upset, and instead of placing an over-emphasis on one-sided concentration on distribution, should adopt a plan of maximum expansion of per capita productivity which would increase individual incomes and national wealth.

The present food problem of India, especially the problem of food scarcity which is now the burning issue of the time, demands a considerable quickening of the pace of the Grow More Food Campaign. It cannot be denied that the present food situation in the country is badly out of balance and in great need of reformation, co-ordination and integration. The immediate issues in connection with the production and employment situation in India are to be solved with special reference to self-sufficiency in food and other raw materials. Instead of adopting a defensive strategy we should follow a strategy based on a reasonable estimate of our resources and a fair appraisal of future difficulties and which would help us to solve our food problem. Our Government should try to step up production of in existing capacity to bring down the prices, while our farmers should become more receptive to new ideas regarding progressive methods of agriculture and use better seeds, better manure and scientific agricultural implements. Under production in agricultural industry may be said to be the main cause for the prevailing inflation of money and the soaring price of commodities at the present time. To quote Wickham

Steed: "Food means distribution and distribution means trade, at least under any approach to normal conditions. Trade again means industrial production to pay for food, and industrial production needs transport by sea, land or air."

The fall in production, currency inflation and the unsettled condition of the country are now mainly responsible for the present unsatisfactory condition of finances in India, while the lack of balance between the growth of population and the meagreness of production lies at the root of our economic backwardness, and the shortness of foreign currency is now operating as a handicap to our importing capital goods for many schemes of industrial development. The dollar shortage, the difficulty in procuring machinery and the lack of proper industrial organisation also account for our present industrial retrogression. The tendency to the hoarding of private capital and raw materials, the shifting about of labourers and mechanics to obtain higher wages, and excessive spending and speculation are handicaps to production in the country. The artificial glut in several important industries leading to closures and unemployment have worsened the economic situation in India.

High industrialisation alone can ensure high production. National self-sufficiency should be the main object of agricultural and industrial development in India. Steel, exploitation of existing oil resources, manufacture of tractors and other agricultural implements, fertilisers, rayon, artificial cotton and synthetic oil are some of the fields which require immediate development in India. An ideal and intimate relationship between agriculture and industry can be created, if there be a development of rural industrialisation. The Rural Banking Enquiry Committee has suggested that there should be a greater development of roads so as to improve rural communications and facilitate better marketing of agricultural produce and that greater use should be made by co-operative banks of the concessional credit facilities offered by the Reserve Bank and that there should be closer laison between them. The Planning Commission is expected to work out its plans in such a way that the new fiscal policy would assist the decentralised growth of industry. Credit facilities should be immediately extended for the agricultural and industrial development of the country. Proper conditions should be created for the employment of capital in fresh enterprise by lifting the wall of uncertainty in regard to official policy in economic spheres.

Any sane taxation policy depends on a reasonable and progressive spirit of adjustment and re-adjustment between the Government and the people. It would be unwise on the part of any Government to overstretch its tax system without any correlation to the economy as a whole and without any consideration to the competin gclaims to the limited sources of revenue, or to impose upon the citizens such a heavy burden of taxation as would diminish the incentive of workers of all grades and reduce the margin of savings available for expanding production.

SWEET POTATO

By
Sri. V. T. SUBBIAH Mudaliar, L. Ag.
(Lecturer in Agriculture, Agricultural College, Coimbatore)

Origin:

THE sweet potato is essentially a crop of the tropics which is believed to have originated in South America. It is grown in the sub-tropics also. Though it is grown in a number of countries, the sweet potato regions are confined to Brazil, southern states of the United States of America, Malaya, East Indies, West Indies, China, India and parts of New Zealand and Australia.

Spaniards are said to have been responsible for spreading sweet potato from South America and Mexico to the other parts of the world. It does not appear to have been known to early Greeks, Romans, Arabs or Egyptians. Early Chinese books describe a number of varieties and some of the names of the sweet potato varieties found therein bear a close resemblance to certain names given to sweet potato varieties in America or New Zealand. Whatever may be the origin of the crop, it is cultivated widely in many countries of the world now and millions of people use it as an article of food. The wide distribution of the potato indicates that it is a popular food crop; it is immensely liked everywhere and its high yield has its own appeal.

Sweet potato is a subsidiary food crop, capable of replacing cereals to a certain extent. It is satisfying to the palate and the stomach and meets nutritional requirements as well as cereals. It was used as a substantial part of the national diet during the war in America. It is an important human and livestock food crop in the southern states of the United States of America. Sweet potato produces larger amounts of carbohydrates from the land than cereals and is therefore a more efficient energy producer. The production of more carbohydrates is the pressing need of the present hungry world.

The accompanying statement furnishes the food values of rice, sweet potato and tapioca, based on the average yields obtained in South India and the food values furnished in Health Bulletin No. 23 of 1941 of the Nutrition Research Laboratory, Coonoor.

	Rice	Sweet Potato	Tapioca
1. Duration in months	5	5	7—10
2. Acreage in Madras State	10,774,620	35,000	41,600
3. Yield in lb. per acre	1,127 (clean rice)	7,628 (tubers)	9,432 (tubers)
4. Protein in lb. per acre	78	28	68
5. Carbohydrates in lb.	892	2,365	3,651
6. Calories per acre (in thousands)	1,776	4,562	6,794
7. Relative calorific value	100	257	382

Tapioca produces nearly 4 times and sweet potato over $2\frac{1}{2}$ times as many calories as rice, from the same area. Tapioca and sweet potato are efficient calorie producers. It must however be said that strict comparisons are rather difficult, because of the wide variations in the requirements in soil, climate and water of the different crops and fundamental differences in the duration of the crops. Any comparison made is therefore artificial and has its limitations.

The following analysis gives the food and vitamin value of tapioca and sweet potato tubers both raw and dried, and rice:

	Tapioca tubers			Sweet potato tubers	
	Raw	Dried	Rice	Dried	Raw
Moisture ...	59.4	13.0	13.0	13.0	66.5
Protein ...	0.7	1.5	6.9	3.1	1.2
Fat ...	0.2	0.4	0.4	0.8	0.3
Mineral matter ...	1.0	2.1	0.5	2.6	1.0
Carbohydrates ...	38.7	82.9	79.2	80.5	31.0
Calcium ...	0.05	0.11	0.01	0.05	0.02
Phosphorus ...	0.04	0.09	0.15	0.13	0.05
Iron ...	0.9	1.9	1.0	2.08	0.8
Vitamin value per 100 grams.					
Vitamin A.	...	...	...	26	10
„ B.	15	32	20	...	...
„ D.	...	...	...	62	24
Calorific value per 100 grams.	159	341	348	342	132

The air-dry tubers are as rich as rice in carbohydrates and the value of the other nutrients is not much lower. The tubers are mainly a carbohydrate food, capable of making up the deficiency of rice, as a subsidiary item of food. It is in the national interest, to switch over suitable areas from cereals to sweet potato and include this valuable food in the national dietary, as a partial substitute for cereals.

Distribution: Sweet potato is being grown in large areas in America and China. In India, however, it was classified as a vegetable crop and the extent of cultivation of sweet potato was not being recorded separately. This has since been rectified and sweet potato acreage is being separately recorded now. Sweet potato is being grown in about 35,000 acres in the Madras State and it is 0.1 per cent of the total cultivated area.

In Madras, South Kanara leads in the extent of cultivation of sweet potato with 14,000 acres and Malabar, Visakhapatnam, Tiruchirapalli, Salem and Tirunelveli have small areas under cultivation. This shows that sweet potato can be successfully grown all over the State.

Description: The sweet potato is a plant of the family of *Convolvulaceae*, with a trailing habit. The stems are thin, pliable and vinous;

the tender stems are light green and the mature stems are dark green, or pigmented in varying shades of purplish or reddish-brown. The leaves are variously shaped and placed alternately on the stem. Some varieties have leaves which are entire and heart-shaped and some are palmately lobed in different degrees with light indentations to deep fingering. The colour of the leaf stalk and the veins of the leaf are more or less of the same colour pattern as the stem. The flowering of the crop is said to be extremely sparse and not common, but the crop flowers freely under South Indian conditions. Seed-setting is not normal, due to incompatibility of pollen of the same variety, but pollen from other varieties are capable of fertilising the ovaries. Artificial crossing of varieties has been done successfully to produce new varieties and forms. The vines that trial on the ground send down roots from the nodes. The sweet potato roots develop into tubers that are variously shaped, rounded, elongated, bulged at the centre or at the ends and conical-shaped with the bulge at the base or the tip. The rind of the tubers is whitish, creamy, yellow or pinkish. The flesh is either 'dry and mealy' or 'moist and sugary' on cooking, depending upon the variety.

Sweet potato is propagated vegetatively by planting stem cuttings generally and in certain cases tubers. The number of varieties of sweet potato is therefore limited, when compared to other crops raised from seed. A number of varieties are said to be grown in America, East Indies, Hawaii and China. The local names given to varieties differ from place to place and the nomenclature is often confusing.

Climate, Water and Soil Requirements.

Sweet potato thrives in a warm climate as in the tropics. It is also grown in the sub-tropical regions, but it does not stand frest and has to be grown during frest-free periods. In the sub-tropical regions, the crop requires a clear growing period of 4½ months, warm nights, abundant sunshine during the day and moderate rainfall. In the tropics, however, the growing period need not necessarily be so long; there are varieties which mature in about 100 days; there are also others that stand in the field for over 5½ months. The duration of the crop is more or less a varietal character. There is an indication that the crop exhibits photo or thermo-periodism. The best tuber formation is in the cooler months of the year. The summer crop trials at the Central Farm, Coimbatore were a failure, either due to the prevalence of high temperature or long hours of daylight. Since the crop matures in long day periods in the U. S. A., and also in the West–Coast districts of this State, the higher summer temperature may be a disturbing factor. Short-day light on the other hand favours the formation of flowers.

The sweet potato crop makes good growth and comes up well as a purely rain-fed crop, where the rainfall is plentiful and well-distributed as in Malabar and South Kanara Districts. It is grown as an irrigated crop in the other parts of the State, where the rainfall is comparatively less. It is not able to withstand drought or stagnation of water. Excessive irrigation tends to promote rank vegetative growth at the expense of the tuberformation.

Sweet potato comes up best in deep, loamy soils and sandy soils, which are friable. Soils that harden on drying, shallow soils, clayey soils and soils rich in organic matter are not suitable. The growth of the vines tends to be excessive in clayey soil and rich soils, with correspondingly reduced yield of tubers. The heavy soils do not permit the development of the tubers and clay adheres to the tubers at harvest and spoils their appearance. The physical texture of the soil affects the size, shape and texture of the tubers. Nitrogen-rich soils and soils manured heavily with nitrogen tend to develop the vines at the expense of the tubers. This is particularly so when the manure is not properly balanced and lacks potash. The advice given in foreign countries is to apply 1,000 to 1,500 lb. of a complete fertiliser containing 2—3% nitrogen, 8% phosphoric acid and 10% potash with at least 50 per cent of the nitrogen in organic combination.

Varieties.

The varieties of sweet potato, under cultivation are limited when compared to the diversity and multiplicity of varieties noted in other crops. America, East Indies, Hawaii and China are said to have many varieties and the number of local names is confusing and complicates the study and classification of varieties. The cultivators recognise two varieties, or to be exact two types, only based on the colour of the rind of the tuber—"Red" or "White." The general concept is that the red variety is an early variety with a low yield, but with excellent table qualities and that the white variety is a late type which gives heavy yields of tubers of a slightly inferior quality. This is not a correct basis of classification, since a number of varieties with a common rind colour are grouped together as one variety.

The next classification of type is based on the cooking quality. Certain types are granular in texture and opaque on cooking and are dry for consumption. These are called "Dry and mealy" types. When the tubers cook to a waxy material that is translucent in appearance, the type is called "moist and sugary" or "moist-fleshed."

Classification of varieties is also done on leaf and petiole characters, pigmentation and so forth. Certain varieties have nearly rounded and entire leaves, while at the other end are some varieties with deeply lobed leaves.

Uses.

The sweet potato tubers are mainly used as a vegetable in different ways, either raw, boiled, steamed, baked or roasted. They are also used for canning and dehydration. Dehydrated chips and flour keep well in storage. Starch, syrup and alcohol are made out of the tubers on an industrial scale in America and sweet potato is coming into the lime-light, as a big commercial crop in place of corn and cotton.

The tubers not fit for human consumption and the sweet potato vines are used as feed for cattle, horses, sheep and pigs. The vines are also made into silage in a small way in America, but it is said to be slimy and inconvenient for handling. The vines could be cured into hay of medium to good quality. The green vines are fed to cattle in this country and what is not immediately consumed goes to the manure pit, a wasteful procedure. The green vines is a good feed for milch cattle, comparable with succulent leguminous fodder in value, but are apt to loosen the bowels when used as the sole roughage. 30–40 lbs. may be safely fed per head per day and supplemented by dry fodder. The surplus vines may be dried and made into hay. The vines contain about 17 per cent of proteins on an air-dry basis and properly made hay may be treated as a protein-rich feed.

The following analysis of sweet potato, compiled from various sourses, gives an idea of the value of the different types of produce.

	Green vines	Vines (air-dry)	Silage	Tubers (range of)	Desiccated tubers
Moisture ...	86.42	100.00	54.87	78.26—58.85	10.46
Ash ...	2.98	19.75	1.85	0.76 — 1.58	3.04
Crude protein ...	2.58	17.11	1.82	1.02 — 2.01	4.50
Fat ...	0.32	2.12	0.66	0.55 — 1.66	1.18
Crude fibre ...	3.05	20.22	1.48	1.11 — 1.69	1.91
Carbohydrates* ...	4.65	30.80	39.41	15.38—34.42	78.91
	100.00	100.00	100.00		100.00
*Inclusive of					
Invert sugars ...				2.08 — 5.74	18.55
Sucrose ...				0.58 — 7.23	10.93
Total sugars ...				2.77—11.90	29.48
Starch ...					46.22

The sweet potato tuber is a good source of carbohydrates, present in a palatable form. The moisture content of the different varieties range from 58.85 per cent. To put it in another way, the dry matter content ranges from 21.74 to 41.15 per cent and the carbohydrate content from 15.38 to 34.42 per cent, and this is very significant to us. The higher carbohydrate content is more than twice the lower carbohydrate content. The relative values of varieties depend therefore not only on the yields but also on the carbohydrate content of tubers. Since the carbohydrate content closely follows the dry matter, the relative values may be appraised by comparing the yield of air-dry matter content of the tubers. For practical purposes the yield of air-dry tuber provide a basis for valid comparison. The air-dry material has a moisture content of about 10 per cent and air-dry matter yield automatically includes the yield of green tubers and their dry matter content.

General Cultivation.

Sweet potato is generally cultivated by planting cuttings of stems having 4–6 leaves and which are called "setts." The vines are taken from a previous crop or a special nursery raised by planting vines or small-sized tubers. The planting is done on ridges spaced 2–2½ feet apart, with a distance of 9 inches to one foot between the setts along the ridges, or in beds. The crop is usually irrigated in this State, though purely rainfed crops are raised with the South-west monsoon rains in Visakhapatnam, Malabar and South Kanara Districts. It is generally grown as a rainfed crop in other countries. The vines produced have a tendency to strike roots at the nodes, which is attempted to be averted by occasionally turning the vines in certain cases. Depending upon the variety and season of planting, the crop matures in 100 to 165 days, when the vines are cut and the tubers dug and marketed straight away.

Season.

In Visakhapatnam, Malabar and South Kanara Districts, the rainfed crop is planted in June, with the onset of the South–West monsoon. In Visakhapatnam District, a second planting season is September, just when the North–east monsoon commences. In the Nilgiris, the crop is planted in April–May with the help of the pre-monsoon showers.

The irrigated crops are all planted from September to November, almost throughout the state, though plantings may be done later in certain cases. These crops get the benefit of the North-east monsoon rains and are later irrigated when necessary. 10 to 20 irrigations are given to the crops on the whole. The crops planted in the other months of the year do not generally form tubers properly which may be due to either photo-or thermo-periodism to which the crop is subject.

Tuber formation commences after the close of the North-east monsoon. This assures freedom from stagnation of water for the tubers during heavy rainfall periods. Stagnation of water during the growing period does not appear to be so harmful to the crop as during the tuber forming and maturing phases. The nights are particularly cool during the period of formation of tubers and this is helpful.

Preparatory Cultivation.

Sweet potato is usually grown after a cereal crop. After the harvest of the previous crop, the land is ploughed 4–6 times, to bring about a fine, powdery condition of the soil. Since the sweet potato field is usually friable and loamy, proper tilth is easily socured. Just before the last ploughing, cattle manure is applied at 10 to 40 cart-loads (5-20) tons per acre. In the Circars region, cattle are penned in the fields during summer, instead of applying the cattle manure. A levelling board is sometimes worked over the land for breaking clods. Finally the land is thrown into ridges and furrows, 2–2½ feet apart or into beds 3–4 yards square, with irrigation channels in-between every two rows of beds. In the coastal sandy soils, however, beds 4 feet by 20 feet are formed for planting the setts, as at Bapatla and irrigation is done by splashing water from mud pots.

Manuring.

Sweet potato is an exhausting crop and requires for its growth large quantities of nitrogen, phosphoric acid and potash. It has been computed that a 11,000 lb. crop removes from an acre of soil, the following manurial ingredients:—

	Nitrogen	Phosphoric acid	Potash
Tubers (11,000 lb.)	30	10	50
Vines dry weight—1 ton	40	11	33
Total	70	21	83

Sweet potatoes may be taken to yield S to 10 thousand pounds of tubers per acre in this country and an ordinary crop may be expected to remove ingredients of plant food from the soil, almost as much as shown above. The heavier the crop, the greater will be the removal of plant food ingredients. The large doses of cattle manure applied here may normally be expected to supply a sufficiency of plant food ingredients to the sweet potato crop. The soils are generally well furnished with potash, except the West-coast Districts, where however, wood ash is applied in addition to other manures.

The cultivators in the coastal areas apply 1–2 cwts. of ammonium sulphate per acre to the sandy soils. Fish guano, tobacco stems and wood ash are applied in Malabar and South Kanara Districts, before ridging up the crop. Green leaves are also applied in addition, in the South Kanara District.

American workers have recorded that manuring the sweet potato crop with ammonium sulphate and other inorganic manures for the supply of nitrogen, tends to produce vines at the expense of the tubers and to induce low keeping qualities in the tubers. While nitrogen promoters vegetative growth and builds up the plant body, phosphoric acid is required for the proper development of the roots. Tubers are after all roots enlarged by the deposition of starch and sugar and tuber formation and development are associated with the availability of phosphoric acid. Potash aids the elaboration of starch in the green leaves and its translocation to the tubers. The importance of an adequate supply of potash cannot be over-emphasised. Where potash is in short supply, the sweet potato leaves get thickened, there is derangement in the machanism of translocation of starch to the tubers and the tubers do not develop properly. South Indian soils are said to be supplied with a sufficiency of potash, but poor soils would be benefited by potassic manuring. The application of wood-ashes as in Malabar and South Kanara are attempts to add potash to the soil. Even in other areas complete fertilisers may help to increase the yields.

Yields.

The yield of tubers is variable. The rainfed crop gives 5,000—7,000 lb. of tubers per acre and a variable quantity of vines. The yield of irrigated crops ranges from 4,000-24,000 lb. of tubers per acre, with an average of 8,000 lb. for the whole State.

The vine yield of the irrigated crop ranges from 10,000 lb. to 20,000 lb. per acre. Sweet potato planted in November–December, as a green fodder crop gives 3—4 cuttings of vines from March to May, aggregating 55 to 70 thousand pounds per acre. The growth of vines during the summer months is vigorous, when compared to the growth of other green fodder crops.

Tuber yield appears to be associated with the vigour of the vines but not necessarily with the growth of the vines. A certain extent of growth of the vines is necessary for the production of tubers, but excessive, rank growth of the vines is at the expense of the tubers. The proportion of vines to tubers may be a primary varietal character, but is greatly influenced by the richness of the soil, its content of organic matter, and the preponderance of nitrogen in the manures applied, without being balanced by sufficient quantities of potash.

Information on the performances of the local varieties of sweet potato under cultivation in this state is lacking. Preliminary observation of six varieties of sweet potato introduced at the Agricultural Research Station, Koilpatti from Travancore in the 1948—'49 season, indicates that there are wide differences in the potential capacities of the different varieties. Whether the heavy croppers would behave consistently year after year and maintain their relative superiority remains to be seen. The yields obtained in the first year of the trial are however given below:—

No.	Name of variety	Yield in lb. per acre			Vine-tuber Ratio
		Tubers	Vines	Total	
1.	Seelanthi chuvalai	28,206	15,857	44,063	0.56
2.	Aruvan Vellai	25,448	27,069	52,517	1.06
3.	Dindigul variety	15,220	19,189	34,409	1.26
4.	Bhadrakali	12,455	25,473	37,928	2.04
5.	Parenkima	10,241	33,291	43,540	3.24
6.	Kuduku Vellai	8,445	26,540	34,992	3.12

Veriety No. 2 leads in the total production of succulent tubers and vines. No. 1 leads in the production of tubers. Where vines are fully utilised the preference may be for variety No. 2; otherwise preference may be for variety No. 1.

The choice of suitable varieties should help in increasing greatly the yield and profits obtained and consequently in popularising the crop and expanding the acreage under it.

The 'Pelicon Processor' one of the starchy varieties of sweet potato evolved in U. S. A. for use in industries is said to yield 20 to 30 thousand pounds of tubers per acre and the table variety 'Puerto Rico' an average yield of 16,500 pounds of tubers, with yields going up in some cases to 33,000 lb. per acre, in America.

(Madras Agricultural Journal)

MEASURING LIGHT

Dr. Essen finds its speed as 1,86,28,218 Miles

By
Dr. TREVOR I. Williams

"OVER in a flash" is generally taken to mean that something has happened instantaneously, but to the scientist it may mean a definite interval of time. The reason for this is that, although in ordinary every-day experience light travels instantaneously from one place to another, in fact it travels at a definite, though enormous speed. Roughly speaking this is 1,86,000 miles per second, far greater than the greatest speeds we normally encounter. A rifle bullet, for example, travels at little more than 1,093 yards per second.

As the speed of light is so very great it is scarcely surprising that for centuries it was considered to travel instantaneously, though centuries ago some shrewd observers at least suspected that it might be measurable. Galileo, for example, as long ago as the 17th century tried to measure the speed of light in the following way. He himself stood on a hill-top with a lantern closed by a shutter; on another hill-top several miles away stood a friend with a similar lantern.

Suddenly Galileo opened the shutter of his lantern; as soon as the friend on the other hill-top saw the gleam he opened his lantern. If the light took a definite time to go from one lantern to the other, then obviously there would be an interval between the opening of Galileo's lantern and his seeing the light of his friend's, the interval being the time taken for the light to travel there and back. But from his experiments Galileo found no interval at all and could, therefore, conclude only that, if light has a speed at all, it must be too great to be measured in this way.

First Measurement.

Not unexpectedly, the first definite measurement of the speed of light came from an astronomer, for it is only astronomers who deal with distances so enormous that, even at speeds such as that we now know light to possess, journeys take an appreciable time. In 1676 the Danish astronomer, Roemer, from observations of the eclipse of Jupiter's moons, discovered that light travels at a definite speed, which he calculated to be 1,92,000 miles per second.

Today astronomers commonly express the distance of the more remote celestial bodies in terms of light-years—one light-year being the prodigious distance light travels in one year. Even though there are 3,15,60,000 seconds in a year, the distance of some of the more distant stars is measured in terms of hundreds of light-years.

The first successful experiment of this kind was made almost exactly a century ago, in 1849, by a French physicist named Fizeau. He used a toothed wheel which rotated at high speed. A beam of light was shone on the edge of the wheel and fell on a mirror four miles away which reflected it back again to the wheel. At a certain speed, however the reflected light got no further on its return journey than the edge of the wheel, for in the time taken for it to travel the eight miles to the mirror and back, the gap through which it had escaped had been closed, due to the wheel's rotation, by one of the teeth.

Quite recently, in 1935 Michelson, working in the United States, carried out somewhat similar experiments in which the light was made to travel along a metal tube a mile long from which, for the sake of extreme accuracy, all the air had been pumped out. His final value of 1,86,271 milespersecondhas sincebeen accepted throughout the world as absolutely accurate.

Essen's Experiment.

Now, however, measurements carried out in quite a different way in London at the National Physical Laboratory, which is maintained by the Department of Scientific and Industrial Research, show that, despite his immense care, Michelson's value is too low by 1,11,847 miles per second.

This determination, made by Dr. L. Essen, is remarkable in that the path travelled was not measured in miles but in inches; it was, in fact no more than seven inches in length. This distance is traversed in a matter of one ten-thousand-millionth of a second.

To make this extra-ordinarily delicate measurement Dr. Essen used not ordinary light, but a radio valve of very short wave-length. This wave was sent down the tube and then reflected back and forth repeatedly between its ends. Under certain conditions the waves travelling in the two opposite directions reinforce each other and sent up a sort of resonance which can be detected with extremely high precision and which consequently gives a very accurate measure, indeed, of the time taken for the wave to traverse the tube.

Practical Uses.

What, it may well be asked, is the use of knowing the speed of light with such great accuracy? In fact, the measurement does far more than satisfy the scientist's normal love of accuracy; it has practical results of the greatest significance.

Again, the speed of light is an essential factor in many of the fundamental formulae of atomic physics; it enters, for example, into the Einstein relationship between mass and energy.

At first Dr. Essen's new figure was accepted with some scepticism, because of the extreme care with which Michelson had made the earlier measurements. Subsequent experiments carried out in both Sweden and the United States, however, have now fully confirmed his results, and thus the National Physical Laboratory, which, among many other tasks, is charged with the national duty of preserving the standards of British weights and measures, now also has given the world a new standard of the speed of light— 1,86,282 miles per second.

CHANGES IN WORLD FOOD OUTLOOK

DUE TO KOREA WAR FORECAST BY (FAO)

FUNDAMENTAL changes in the world food outlook have resulted from the crisis in Korea and the consequent expansion of military defence and assistance programs, the Food and Agriculture Organization (FAO) of the United Nations reports in its annual study, entitled "World Outlook and State of Food and Agriculture—1950".

The study concludes that world food supplies in 1950—51 will register only a slight gain, with actual and prospective changes moving mainly in the direction of greater purchasing power, fewer currency impediments, and a greater volume of international trade.

"It now appears that, at least during the next year or two, the requirements of both producing and importing countries will be so substantial that the threat of unmarketable surpluses will fade," the report states.

Other highlights of the report are summarized by the FAO as follows:—

"Widespread expansion of military programs will lift purchasing power. Thus, demand for agricultural products will be stronger than had been anticipated.

"Higher import demands and military aid expenditures of the United States will lead to an appreciable increase in the dollars available throughout the world for purchases of foods, including agricultural products, from the United States, Canada, and other countries. Thus, some of the currency impediments to international trade will be reduced.

"The volume of international trade will rise and its general pattern should tend to improve.

"Both buying power and supply, however, can be considered favorable only in comparison with earlier years. In all, world food supplies per person in 1950—51 will be larger than in the year before, but the gain will be slight. Supplies of food and the ability to buy it are still far below the levels required to give all the world's people nutritionally adequate diets."

These developments will help move the level and pattern of world trade in the direction required for a long-term solution of international trade and payment difficulties, FAO Director General Norris E. Dodd says in a foreword to the report.

Noting that demand for products directly related to military preparedness has been intensified since the Korean fighting began, the Director General points out that it is not possible to increase supplies of these scarce products in the immediate future.

In the agricultural field, wool and rubber are mentioned as the major commodities affected, with rice and to a lesser extent cotton, coffee and cocoa also beginning to feel the pressure of rising prices. Governments already are discussing with one another the possibilities of controlling the movement of certain scarce commodities through international action, Dodd adds.

Dodd says that since measures to improve distribution of scarce supplies are emergency expedients at best, governments must give increased attention to action which will favor continued high production by giving farmers assurance of a fair return when their products come to market.

Dodd also calls the attention of FAO member governments to two other issues suggested by recent events. One is the likelihood that the United Nations, having undertaken military action in Korea, can be expected also to take responsibility for relief and rehabilitation, in which case FAO, along with other specialized agencies, may be called on for work in its field.

The other issue, Dodd says, "is the clearly shown need to forestall war or civil disturbance by vigorous agricultural programs before, rather than after, the crisis begins." Pointing to land reform as a basic problem in most of Asia, he poses as a primary example for study the question of how technical assistance programs can be shaped so that their benefits will not be withheld from people on the land through unjust and inefficient systems of landholding.

"Other long-term trends and issues," he says, "have a bearing on the immediate questions concerning supply and distribution of farm, fisheries and forest products."

Dodd sees the new technical assistance program as "a powerful force, both in the immediate future and for the long pull, in increasing the production and dollar-earning capacities of the less-developed countries and thus contributing to a larger and more balanced world output and trade." He points out that the present regular programs of FAO are working to these ends, and cites current plans for co-operating with the United Nations Secretariat in broad new studies of economic factors underlying international trade and payments.

The report also includes a section which summarizes the world food outlook by areas and by commodities.

Barring further unfavorable weather, crop production in the Far East in 1950—51 may increase slightly, but any anticipated increase would leave per capita food supplies below the prewar level. Reported midsummer floods in China, however, indicate that improvement, if any, in wheat, rice, and secondary crops will be less than expected.

Better prospects are seen for industrial and agricultural activity and income in the Indian subcontinent, Indonesia and Japan. Commercial agricultural producers in Asian exporting countries have gained from the expansion of import demand in North Amsrich, and in some cases have gained from changes in the terms of trade following devaluation. These developments will probably continue, the report says. Production and standards of living can increase as rapidly as investment and economic development can provide new facilities for transport, communications, and commerce.

FAO estimates that total volume of world trade may expand by more than one-tenth in 1950–51, although agricultural exports are not expected to expand in the same degree.

"Dollar earnings will rise because of increased armaments expenditures by the United States", FAO says: "This will ease the pressure of dollar shortages, and modify the previous plans of many countries for further cuts in their purchases from hard-currency areas during 1950–51."

In the case of selected commodities, the report looks for 1950–51 grain crops in the Northern Hemisphere to be somewhat larger than last year, with exportable supplies at least as large as those of 1949–50.

Increased output of rice in 1950–51 appears likely in the Far East, although supplies will continue short compared to other grains, and relatively high prices will probably prevail.

A substantially larger crop of sugar is also forecast for 1950–51, continuing the current upward trend in which all regions have shared. Consumption has kept pace with production, and much more could be consumed if rationing schemes were relaxed or high prices reduced, the report says.

World production and consumption of fats and oils are expected to continue their current advance, with the increase occurring largely in the regions where supplies are shortest relative to prewar.

In the case of cotton, FAO estimates that consumption in 1950–51 may exceed output by about 10 percent, leaving a world carry-over as of August 1, 1951, nearly three million bales less than a year earlier. In 1951–52 world cotton production is expected to benefit materially from the lifting of acreage restrictions in the United States and the stimulus of high prices.

As regards rubber, the supply outlook for civilian uses remains tight, despite rapid reactivation and expansion of synthetic rubber production in the United States. Because of the military importance of natural rubber, questions concerning the control of shipments by destination are being currently reviewed in intergovernmental discussions, FAO reports.

Concern is also expressed over the supply situation in wool, as growing military requirements superimposed on a tight world market for civiliam uses cause wool prices to soar to record levels. Here also, FAO says, plans for international action have been projected in intergovernmental talks concerning the possibility of a system of allocations for raw wool. USIS

NEW PROCESS FOR SULPHUR PRODUCTION

British Survey of Desert Lakes

PRODUCTION of sulphur by new methods and the development of a new industry in Great Britain may result from investigations now being carried out.

Two scientists from the Chemical Research Laboratory, DSIR, have recently completed a survey of lakes in Libya in connection with the research. These desert lakes are full of micro-organisms known as sulphate reducing bacteria which reduce sulphates to sulphides. Sulphur can be produced from hydrogen sulphide by simple aeration. The rate of production of sulphide is low and to make the process economically feasible it is necessary to speed up the reduction of sulphates to about ten times its normal rate. The research has this object in view.

Three methods of research will be used. Strains of bacteria from various parts of the world will be examined for their speed of reduction, the influence of different environments will be investigated and methods of obtaining possible quick reducing strains by artificial means will be explored. The sulphate reducing bacteria were originally studied in detail in this country because of their corrossive action on buried pipes.

The two scientists engaged on this research, Mr. K. R. Butlin and Mr. J. Postgate, have been examining lakes in Tripolitania and Cyrenaica. From a report received in 1949 it seemed likely that sulphur was being produced in these lakes in fair quantity by biological processes and that an examination of them would yield information and cultures of scientific interest.

A "Desert Laboratory."

Accompanied by Arabs, who drove the trucks and cooked, Butlin and Postgate visited several lakes near El Agheila. They were in the desert for a week and took with them a special "desert laboratory" which had been designed and made in the CRL workshops.

Four lakes were examined, and samples taken for later work at the CRL. The scientists found that the first lake they saw was striking in colour. It was a vivid milky blue with a broad band of red round its borders. The Arabs plunged into the lake and scooped up handfuls of yellow mud. It was sulphur.

There was a strong smell of hydrogen sulphide, more familiar to most people as "sulphuretted hydrogen," which is an indication of the action of sulphate reducing bacteria. The red colour of the lake was due to a carpet of gelatinous material which lay on the bed of the lake in shallow water. It was red on the top and black and green underneath.

A well-washed sample was examined later at the CRL and found to consist mainly of pink cells. This is probably a species of organism which produces sulphur from the sulphide in the presence of light and deposits it *inside* the cell. The green colour was produced by other organisms which rapidly oxidise sulphide to sulphur and deposit it *outside* the cell. The bottom of the lake, it was found, was covered with a deposit of about six inches thick of finely divided sulphur.

This formation of sulphur has since been reproduced in the laboratory by including an artificial lake water, based on an analysis of the original, with the red and green material and crude cultures of sulphate reducers. Much sulpur was formed.

Sulphate Reducers.

Two other lakes examined were similar to the first. The fourth had the smell of hydrogen sulphide and was obviously full of sulphate reducers. It was not however producing much free sulphur and it did not have the red border characteristics of the other lakes.

An industrial process based on what takes place in the lake, may will be developed. One small lake contains about half a million gallons and produces about 100 tons of sulphur a year.

Sewage is an excellent medium for sulphate reducers and it might be possible to contaminate lakes in desert areas to facilitate large scale production of sulphur. This is, of course, a highly speculative idea, but it could be tested easily enough.

At present the samples brought back from the desert are being examined and different types of organism isolated. When pure cultures of the sulphate reducing bacteria and of the sulphide oxidising organisms are obtained it will be possible to examine their properties and to make experiments on the production of sulphur in various conditions, in different media and to use solid surfaces such as asbestos and coke to see what effect they have on speeding up the process. It may also be possible to develop artificially highly active strains of bacteria.

FACTS THAT INTEREST

Milk Pasteurized after Bottling.

Reversing usual procedure, a patented process would bottle milk, then subject it to pasteurisation. Bottles are held at 152-155°F. for 30 min. Method is designed to overcome the problem that contamination can and does occur in the usual method.

Colored Highways.

Motorists will see red and black while driving on the new calumet expressway near Chicago. Turnoff lines and ramps will be finished in those colors to distinguish them from through traffic routes. Red dyed concrete and black top will be used.

Tile Floors.

Green asphalt-tile floors are found excellent in stamping plant that makes small precision articles. They are easily kept clean, are resilient and therefore comfortable for workers, and are cheaply repaired.

Wood-waste Board.

Wood substitutes made of woodwastes and urea-formaldehyde are being used in increasing quantities by the building industry in England in place of ordinary plywood. Demand for densified woods is increasing. They are used for bearings and brushes in paper mills.

Aluminium Hand-books.

Reynolds Metal Company three 6 x 9-in. handbooks just published are outstanding in their treatment of this more and more popular metal. The A. B. C.s of aluminium devotes 96 pages to forms, fabrication, advantages and applications. 'Designing with aluminium extrusions' in 138 pages shows the design engineer, and architect how and when to use aluminium. "Finishes for Aluminium" gives 124 pages to the varicus processes for supplying surface finishes.

Underground Mine Radio.

Two-way radio communication system uses trolley lines as carrier cables in Canadian Johns-Manville mine. Radio impulse is projected from the sending set and is picked up by the trolley line. Then it is picked from the trolley line by receiving sets on the surface.

Use Your Salvage.

Solar Aircraft Co. uses most of its salvage material by advertising it. Material conservation board displays samples of all sizable pieces of scrap from stainless-steel stampings. Each piece is labelled with characteristics of material. Production men watch board and use salvage material wherever possible.

Egg Shipment Damage.

Shell egg damage in rail cars, when total lengthwise slack between cases is more than 2 in., is twice as great as when the slack is less than 2 in. Hay or straw buffings and wood space fillers between cases at the centre of the car provide equal protection to the egg cargo.

Increased Fabric Wearability.

Use of non-durable aluminium salt-wax emulsion for increasing wear resistance of fabrics is not warranted for garments subjected to severe wear or severe laundering according to a U. S. Quartermaster Corps Report.

Jet-Action Dishwasher.

New automatic dishwasher operates with what is called "jet tower" washing action. A square tube with 64 holes extends up the centre of the tub. Water is forced through the holes, revolving the tower and forcing water over dishes in surrounding baskets. Spinning creates a brush action on dishes, forcing the dirt downward. The machine, made by Mullins Mfg. Corp., completes a wash and two hot rinses in 9 3/4 min.

Casters and Trucks.

Rapids-Standard Co., Inc. 36p. Catalog CT-50 illustrates Rapistan line of industrial casters and trucks. Complete specifications are given, plus hints on selection of models to suit handling conditions.

Grinding-wheel Handbook.

Norton Co. 108p. Handbook includes not only information on abrasives, wheels and operating hints but also extensive tables on grinding wheel recommendations according to work, material, and grinding operation.

How to Control Losses In Wood-Room Operation.

Paper-mill managements have paid too little attention to wood-room operations, which as a result have been sources of steady losses.

Development of the Weyerhaeuser whole log hydraulic barker was a spectacular step in the right direction. Savings made have amounted to 18-20%. Since then, a hydraulic barker for small round wood and a hydraulic slab barker have been developed.

Much unnecessary cleaning is still being done by knife barkers, knot borers, wood-peckers, beavers, and knot saws. Wood losses from this equipment can mount to 30%. Proper supervision can cut this loss in half. Some sulphite mills have stopped hand cleaning in the wood-room.

Another factor closely connected with wood-room losses is stream pollution. Fines can be kept from the stream by screens, then burned after pressing.

Control of sawdust reduces wood loss. Dull knives increase sawdust by one-third. Conditioning and adjustment of the bed plate is often neglected. Multiple-knife chippers help, especially when operated at or near capacity. A test run with such a chipper gave 1½% sawdust at 20 cords per hr. and 1% at 50 cords.

A rapid method of chip analysis should be provided for chipper-room foremen. Sawdust quantity should be produced on a graph to make it easier to watch trends.

Machines can Crush Ice for Two RR Cars per Minute.

Highly mechanized facilities for icing refrigerator cars have been installed by the Denver & Rio Grande Western Railroad. Facilities provide for storage, 3,600 ft. of low-level loading platform, and two loading machines. The loading machines break the ice to the size needed for each car and mix in the required amount of salt as the ice goes into the car bunkers. It is possible for one of the two self-propelled machines to ice cars at the rate of one per minute.

Conveyors are provided throughout the system to handle the cakes of ice. Two ice crushers on each machine produce any size of ice down to a fine snow.

Adjustable chutes deliver the ice from the crusher to the cars. One chute is designed to deliver ice on the track adjacent to the icing machine track, while the other reaches across the ice dock to cars on the track beyond.

More Pork, More Eggs.

Here are two ideas that work for the farmer:

A Southern farmer installed an attic fan in a large pig pen because hot weather kept the pigs from eating and gaining weight normally. The fan was installed at one end of the pen, and a 4-in. layer of sand was spread over the floor and wetted down a couple of times a day. Air blowing over the wet sand lowered pen temperature by 15°. Result: pigs g ined 1 lb. a day in July and 2 lb. a day in August 28.

U. S. Dept. of Agriculture scientists have discovered that ultraviolet light makes hens lay more eggs. Natural light was excluded from the hen house. Egg output went up 19%.

Gives Quicker Insect Count.

Worm and insect contamination of raw foods can now be detected in one quarter to one-sixth the time needed for the Wildman technique. The new method also is simpler, gives a more efficient recovery of contaminates, and provides a more accurate count of contaminants.

The method, developed at the Oregon Agricultural Experiment Station, substitutes for the Erlenmeyer flask a specially-designed separatory funnel. The funnel eliminates the time-consuming horizontal travel of oil globules in the Erlenmeyer flask and separates pulp and oil efficiently.

Corrugated Citrus Box.

Large-scale tests of a new corrugated shipping container for oranges are under way. Fibre-board for the container is specially treated to retain strength and rigidity under damp conditions and to provide a fungicidal atmosphere for preservation of the fruit.

The board is given its moisture-resistant rigidity by the impregnation of the corrugated medium with molten sulphure by a method developed by the Institute of Paper Chemistry.

Fungicidal properties are imparted by surface application of a waxy substance called Phenodor, a decay-retarding compound.

The treated corrugated carton may find application in other fields where high compression and high humidity mean failure to ordinary fibre-board containers.

Slagging Problems Solved in Wood-Waste Boiler.

Burning wood waste from salt-waterborne logs causes the sodium to pass through the furnace in the form of a sublimate and condense on the cooler surfaces of boiler and super-heater. This layer of slag forms a dry, powdery coating, but succeeding layers remain in a semi-molten condition and act as a bond to hold particles of flyash to tubes.

As slag builds up, it bridges between tubes and blocks gas passages. If the slag is allowed to accumulate and the boiler cools, the slag forms a hard vitreous substance difficult to remove from tubes.

At the new steam plant at British Columbia Pulp & Paper Co., precautions were taken to prevent this condition. The two wood-waste furnaces were made with a large proportion of black surface and an idle pass to cool the gas so as to reduce slagging of boiler passes. Additional access doors were installed, and tubes were spaced to discourage bridging and to aid internal cleaning.

Also, to burn the flyash completely, combustion-chamber turbulence was assured by throat design and air in sufficient quantity is admitted through pinhole grates in the bottom of the chamber.

Watchmen Start Production.

Watchmen at American Optical Co. start production machinery so that it will be ready to go at 8 a. m., when manufacturing operations begin. If the operators had to do it themselves, it would cost the company $3,000 annually in lost production time. If the watchman finds one of the machines he is supposed to start out of order, he calls the proper repair-man to repair or adjust it before 8 a. m.

Metal Cleaner.

Self-emulsifying solvent can be used as is or in emulsion form. S.E.C. Solvent Emulsion Cleaner has been introduced by Chemclean Products Corp., 64 Sixth Ave., New York 13, N. Y. It is a self-emulsifying solvent said to have particularly fast wetting, rapid penetrating, and free rinsing properties that insure wetting recesses, and loosening the bond between basic metals and soils. Used as a pre-soak, it removes buffing compounds, drawing oils and compounds, sulphurized and chlorinated cutting oils, greases and soaps.

Compatible with alkaline cleaners and chlorinated degreasers, it can be used at room temperature to 140°F., as is; or in the form of an emulsion at 1-1 or 1-2 parts water. As a spray, it can be used as is, or in the form of an emulsion up to 1-20 parts water, from room temperature to 140°F.

It is claimed to be non-toxic and practically odorless, and not to attack metals.

Vinyl Adhesive.

Emulsion laminates vinyl sheeting to porous surfaces.

A new water thinnable emulsion type adhesive for adhering vinyl sheeting to porous surfaces has been developed by Thomas W. Dunn Co., Pearl and Dover, New York 7, N. Y. Called Dunn's Vinyl-Hesive, it will bond all flexible formulations of vinyl sheeting to paper, pressboard, cardboard, masonites, felt and other porous surfaces.

Because the material is non-staining, the number of rejects (due to discoloration of the vinyl) is very low. The dried adhesive is extremely resistent to alphatic hydrocarbons, oils, greases, water and to deterioration by bacteria and fungi.

Vinyl-Hesive is expected to find wide application in the food packaging industries since it is relatively non-toxic. Reports from major distributors of vinyl sheet stock indicate that this adhesive should open large fields for supported vinyl sheet stock.

News & Notes

Solvent Extraction Recovers Salad Oil from Rice Bran.

Continuous solvent extraction of rice bran provides rice oil plus improved cattle feed. The oil is stable, does not become rancid, and is satisfactory for salad dressings and cooking. The bran, sold as cattle feed, can be stored with less danger of rancidity.

The process was designed by Allis Chalmers Mfg. Co. and is in use at American Rice Growers Co-operative Association's Houston plant. Capacity is 50 tons of bran per day with production of 15,000 lbs. of crude oil.

Bran that has been removed from rice grains enters the extractor at top. Hexane, the solvent, flows counter-current and picks up oil from the bran. Spent bran is removed at the bottom, passed through a classifier and dryers, and packaged.

The solvent-oil mixture from the top of the extractor is filtered in a leaf-type press where all traces of bran are removed. The clean filtrate is then heated to 180°F. and passed into a flash tank where 95% of solvent flashes off. Remaining solvent is removed in a bubble cap vacuum tower, leaving a clear rice oil.

Continuous Hygirtol Process Makes Low-Cost Hydrogen.

Hydrogen is made from propane by the Hygirtol process at Lookout Oil & Refining Co.'s Chattanooga plant. This process, developed by Girdler Corp., produces 99.75-99.95% pure hydrogen on a continuous basis. It is more economical than electrolysis.

Propane and steam are reacted in a furnace (with nickel catalyst) to produce a mixture of hydrogen, carbon monoxide, and carbon dioxide. The hydrogen is purified in three stages, each consisting of converting CO to CO_2 by the Girbotol process.

The mixture at 700-800°F. is passed into the first-stage converter that has two beds of iron oxide catalyst. CO is reacted with steam to produce CO_2 and H_2.

From the converter the mixture goes through a gas-to-gas heat exchanger, gas cooler, and the first stage absorber. In the absorber a monoethanolamine solution absorbs the CO_2. The gas passes back through the heat exchanger, then to the second-stage conversion. After second and third stages are completed, the hydrogen is dried in an Electrodryer and sent to storage.

The monoethanolamine solution passes through the three absorbers in series, then to a reactivator where absorbed CO_2 is expelled by heat and recovered for use as an inert gas.

Capacity of the plant is 1,50,000 cu. ft. of H_2 per 24-hr. day. It needs only one operator per shift as the entire operation is controlled from a centrally located control panel.

X-Ray Inspects Canned Foods in Packing Cases.

A new X-ray unit developed by the United States Army inspects canned foods for impurities while the cans are in their packing cases. The inspection method uses flouroscopic technique to reveal damaged or deformed cans. It also indicates the degree of deterioration of the contents, as well as corrosion, foreign matter inside the cans, and other defects.

An automatic conveyor belt carries entire cartons of canned food before the X-ray apparatus. Mechanical controls turn each carton to permit it to be viewed from all angles. Cartons containing defective cans are marked and when they reach the end of the conveyor system are separated from the other cartons.

Under the present methods, cases of cans are opened by hand and inspected visually. This means that only the damages to the exterior of the cans or deformities in the cans that indicates food decomposition can be seen.

The new inspection equipment can be mounted on a truck trailer for rapid movement to food storage depots. All sections of the equipment exposed to radiation are screened by sheets of lead to safeguard persons working nearby. The X-ray equipment can also be used to inspect solid fuels in cans.—USIS.

Airplane Quickly Seeds Grass to Prevent Further Erosion.

The United States Soil Conservation Service recently used an airplane to seed grass on thousands of acres of eroded land. Purpose of the project is to give the land a grass cover quickly and protect it against wind erosion so that it can be returned to productive use as grazing pasture for cattle.

A single plane seeded about 15,000 acres in the state of Kansas in about 10 days. This was the largest operation of its kind ever attempted in the United States, according to the *New York Times*.

The land is part of several million acres acquired by the U. S. Government for rehabilitation purposes. This tract is in the heart of an area that by the 1930's had been worn out by intensive farming and cattle grazing.

Before the seeding was started, disk plows roughed up the land to kill sagebrush and weeds and to provide a bed for the grass seed. A heavy seed was used to insure uniformity of spread.

The seed was spread from a light airplane flown at an altitude of less than 50 feet. It was carried in a hopper that can hold up to 700 pounds of seed. On the bottom side of the airplane were two chutes from which the seed was spread. The seed was pushed from the hopper into the chutes by an agitator.

Seeding by airplane has been done before in the United States but on a much smaller scale. The method is said to be less costly than working directly on the land because it takes less time. The Kansas seeding project, which took 10 days by air, would require a month or more by customary land drilling methods, the *Times* says.

World Cottonseed Output Estimated at 12.8 Million Short Tons in Year.

World production of cottonseed is expected to total about 1,28,00,000 short tons in 1950-51. This would be 11 percent less than the 1949-50 output the United States Department of Agriculture says, and 16 percent below the 1935-39 average.

The Department notes that all cotton-producing areas, except the United States, Argentina, the Belgian Congo, and British East Africa, are producing more in 1950-51 than in 1949-50.

Total production in Asia is estimated at 37,80,000 short tons. India is producing about 14,80,000 short tons and Pakistan 5,61,000 short tons. The two countries together yield an annual average of about 30,00,000 short tons in 1935-39. There are no estimates for China, which usually has a large crop.

Total production in North America will be more than 45,00,000 short tons. This compares with the 1935-39 average of about 57,00,000 short tons. Most of the decline is accounted for by the United States. U. S. cottonseed output in 1935-39 averaged 55,50, short tons. In 1950-51 the nations' production will be just under 40,00,000 short tons. Major causes of the drop were low acreage, unfavourable weather; and widespread boll-weevil damage to crops.

Egypt, with an estimated output of more than 10,00,000 short tons, accounts for more than 60 percent of the total production of Africa and Oceania.

Most of South America's estimated output of 12,60,000 short tons will come from Brazil, Argentina and Peru. Argentina, the only one of the three countries for which a forecast has been made, is expected to produce about 2,50,000 short tons, a substantial increase over its prewar output.

Europe's total of 85,000 short tons comes primarily from Greece. That nation will produce about 50,000 short tons, an increase over its 1930-39 average yield.—USIS.

Manufacture of Zinc Oxide in India.

Zinc oxide finds extensive use in the pigment industry. It is also used in the ceramic, rubber, cosmetic and other industries.

In India, Zinc oxide is manufactured from imported spelter. This is an indirect method of producing the oxide and is naturally very costly India has been adopting this process for obvious reasons, because zinc ore was not produced till now in this country. The Metal Corporation of India, Limited, which operates a lead-zinc mine at Udaipur, are shortly expected to bring their ore-dressing plant into production stage when about 12 to 15 tons of zinc sulphide concentrates will be produced daily. Till a reduction plant is put up in India to utilise these concentrates for production of spelter, perhaps the best possible outlet for these floatation concentrates will be for the manufacture of zinc oxide. This will also eliminate imports of spelter into India for this purpose.

The various methods employed for the manufacture of zinc oxide, as practised at present in various countries, their comparitive merits and demerits and their suitability for adoption in India are discussed in an article appearing in the September 1950, issue of the Journal of Scientific and Industrial Research.

Of the methods described, the electrothermic process which is adopted by St. Joseph Lead Co., U. S. A., is said to give a very high grade zinc oxide but the initial cost of the plant is high, so also is the operating costs. The weatherhill and the Waelz processes are extensively used in the United States. In the former process many improvements have been effected in recent years by which the output per furnace is increased, resulting in lower operating and investment costs per pound of product. The improved weather hill process employing the travelling grate appears to be suitable for zinc sulphide concentrates and the quality of product is easily controlled. The Waelz process is simple and relatively cheap for treating low grade ores and for recovery of zinc from lead smelting furnaces.

Electronic Meteorological Instruments.

A few of the electronic meteorological appliances which have been in use in the India Meterological Department are of special interest. The radiosonde, devices employing radar, the distant reading wind instruments and the cielometer are a few of the instruments illustrated and described. The Department has effected a number of improvements in the design of many accessory units which have been manufactured in the workshops of the India Meteorological Department.

Fluidisation.

"Fluidisation" is a term commonly employed in the present day industrial practice whenever fluid characteristics or properties are imparted to solid particles during certain process in industry.

This technique is one of the outstanding achievements of chemical engineering in recent years and has revolutionised a number of industries and opened up new possibilities. Many countries of the world including India are engaged in intensive research on its applications. An article on this subject included in the journal presents the salient features of this technique, its applications to a few industries and indicates the recent trends in its developments.

One of the important applications of this technique is in the synthesis of liquid fuel from coal. Another important application is in washing of coal employing float and sink principle to remove the impurities adhering to it. Purification of town gas from sulphur, conversion of sulphur dioxide to sulphur trioxide, carbonisation and gasification of non-caking coals are a few of the other problems which have been tackled by employing this new technique.

Manufacture of Citric Acid And Calcium Gluconote.

Citric acid is obtained by the fermentation of technical glucose or Sugarcane by the fungus. Aspergillus niger. Investigation on this problem conducted under the auspices of the Council of Scientific and Industrial Research has resulted in the isolation of a giant strain of this fungus which produces only citric acid and no oxalic acid.

The fungal mat or mycelia from the citric acid process is utilised in the process for the manufacture of calcium gluconate. Technical glucose or starch hydrolysed by heating with acid are the raw materials employed. The process which has many advantages over the older methods of production is covered by the Indian Patent No. 39441. Further information on these processes can be had from the Secretary, Council of Scientific and Industrial Research, New Delhi.

Of the research papers one relates to data obtained on 19 varieties of woods from Madhya Pradesh which have been subjected to destructive distillation. The data which refers to the yield of charcoal, pyroligneous liquor, wood tar and other bye-products is valuable in assessing the suitability of these woods for wood distillation industry.

FOOD FOR THOUGHT.....

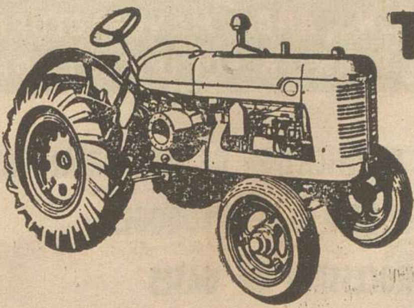
Food for thought, at the moment is.... thought for food. Like any infant, this infant republic, too requires food, more food and still more food, to make it strong. And towards making it strong, you and we have a responsibility.

WE HAVE A REPRESENTATIVE SELECTION OF AGRICULTURAL PUMP SETS FOR YOU TO CHOOSE FROM. WITH ONE OF THESE YOU CAN INCREASE YOUR CROP YIELDS... AND MAKE THE NEW REPUBLIC STRONG.

The SOUTH MADRAS AGENCIES LTD.,

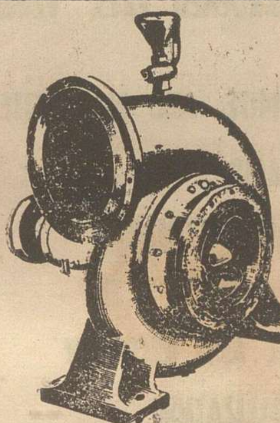
POWER HOUSE,

TENNUR, TIRUCHIRAPALLI



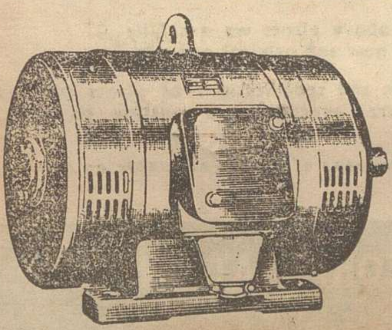
TRACTORS

and implements for all agricultural operations, even for small farms. Tractors with belt pulley are a source of stationary power for pumping, chaff-cutting, threshing.



PUMPS

for irrigation and other purposes.



MOTORS

for all purposes in a wide range of horse-power.

VOLKART

VOLKART BROTHERS

CHEMICAL AND GAS ENGINEERING CONTRACTORS

SPECIALISTS IN DESIGN AND MANUFACTURE OF COMPLETE PROCESS PLANT & EQUIPMENT FOR

- PRODUCTION, COOLING AND PURIFICATION OF INDUSTRIAL GASES
- WATER GAS, PRODUCER GAS, HYDROGEN
- CATALYTIC PROCESSING OF GASES
- REFINING AND HYDROGENATION OF OILS AND FATS producing EDIBLE AND INDUSTRIAL OILS, HARDENED FATS, VEGETABLE GHEE, FATTY ACIDS, GLYCERINE
- CALCINATION OF LIMESTONE, DOLOMITE, AND MAGNESITE
- SULPHURIC ACID
- AMMONIA AND METHANOL SYNTHESIS
- AMMONIUM SULPHATE AND NITRATE
- DUST AND FUME CONTROL AND RECOVERY
- INDUSTRIAL CRYSTALLIZATION

Although specializing in the above plants we are fully equipped to undertake other new and original projects.

We are prepared to collaborate in design and specifications of plants planned by clients right through to manufacture, erection and putting to work.

Illustrated bulletins describing the various types of plants available on request.

THE POWER-GAS CORPORATION LTD

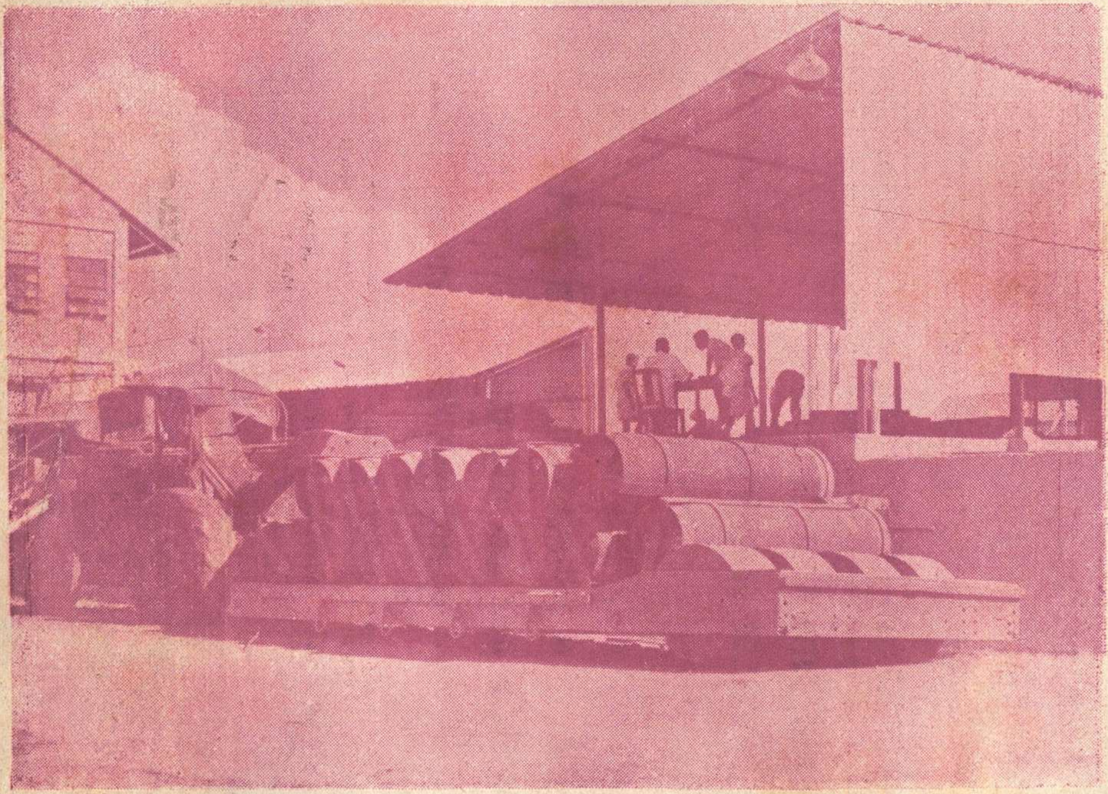
STOCKTON-ON-TEES ENGLAND

AND

P. O. BOX 1331, BOMBAY

ALSO

LONDON, AUSTRALIA, CANADA, SOUTH AFRICA



Filling Barrels.

Licence No. 663 Dated 21st July 1949.
Monthly: Annual Subscription Rs. 3/- Single copy As. 4/-

Radioisotopes, bye-products of exploding atoms, are being used for treatment of some human diseases, particularly diseases of the thyroid gland. They are of great value in diagnosing certain forms of cancer. These cancer research specialists are tracing radioactive elements in a pathological specimen with a mass spectrometer at the Memorial Cancer Centre in New York City.

The training of atomic physicists and technicians and the development of new instruments is important to the development and use of automic energy. Many universities in the United States and in other countries are co-operating in the training program.

Printed by P. Sreedharan Pillai at the S. G. Press, Parur and Published by him for The Fertilisers And Chemicals, Travancore Ltd., Alwaye.