FACT

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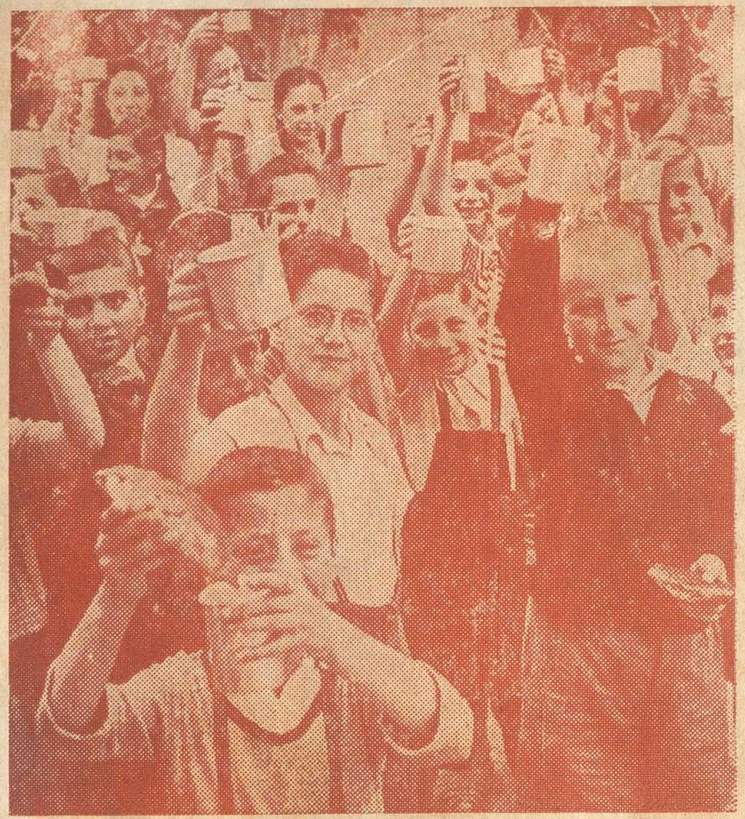
United States agricultural scientists have developed hybrid seed that increase the yield of cornfields by about 25 percent. In 1933 only 1 acre of corn in 1,000 was planted with hybrid seed. Today, hybrid corn acreage approaches 70 percent in the United States. Hybrid seed are inexpensive and can be bought at any seed store. This young farmer examines a full ear of corn grown from hybrid seed.



Since 1946 the United States has provided nearly two-thirds of the total of $ 15,20,00,000 contributed to the United Nations International Children's Emergency Fund. Large quantities of dried milk, bought at low cost in the United States, have been distributed to children in many countries of the world. These youngsters in Athens, Greece, eat breakfast provided by the United Nations Children's Emergency Fund.

High School students from all parts of the United States, in their desire to understand the operations of the United Nations Organization, frequently visit United Nations headquarters in New York City.

This photograph shows a group of High School students from Dayton, Ohio, examining miniature United Nations flags in the U. N. Bookshop at Lake Success, New York.

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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.

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EDITORIAL.

India's National Income.

THE Government of India had appointed a Committee in 1949 for carrying out investigations and collecting accurate data in respect of the National Income of the country. This committee submitted a first report to the Indian Parliament early this month.

In the 1948–49 estimates made by the Committee Part B and C states were included but not Pakistan. It was therefore not easy to compare the figures with those, for 1931–32, when Pakistan was included but not some of the part B and C states which were outside the area then known as British India. Bearing this in mind, and making due allowances for readjustments in area, it is being pointed out that the proportion of National Income attributable to agriculture and livestock industries does not show any definite increase in 1948–49 as compared with 1931–32.

The total net income of India during 1948–49 had been Rs. 8720 crores. The population of the period being 3410 lakhs, this works out at the rate of Rs. 225 per head of population. But all the above 3410 lakhs of people are not actively working to produce this income, for it includes non-workers such as children, the aged, infirm, disabled, and so forth. Excluding such persons it is estimated that the number of actual workers is only 425 per-

sons for every 1000. Thus it would be clear that actual *per capita* income by the working members of the nation is about Rs. 660.

The percentage of workers employed in various occupations is an interesting feature to note, and it is roughly in the following order.

Agriculture	68·2%	Domestic Service	3·2%
Industries	13·6%	Transport	1·8%
Commerce	6·2%	Military	1·4%
Professions	3·8%	Public Services	1·3%
		Mining	0·5%

It would be seen from the above figures that the persons actually employed in productive enterprises average about 82·3 per cent of the total population. These consist of those employed in agriculture, industry and mining only, the rest being non-producers.

The total output of these producers is estimated as amounting to Rs. 5650 crores or about 65% of our gross national income. It would also be seen from a close analysis of the figures that our agricultural workers consisting of 68 and odd per cent of the total, produce only about 47% of the national income.

It is significant to note that a land teeming with plenty of natural resources, and which claims agriculture as its main national occupation, is thus rather backward in its income producing capacity under that head. This is a very doleful commentary on the peoples' as well as the Government's activities for rural development and self-sufficiency drive. A more equitable redistribution of land, may, to a certain extent aid the recovery of income in this direction and the proposed scheme for the organisation of a land army may also help a little way. But more than anything else, scientific cultivation on a country-wide basis using modern implements of production, as well as the utilisation of up-to-date and accurate information in the matter of seed selection, irrigation, manuring and so forth, are undoubtedly the pressing need of the hour.

The first report of the National Income Committee thus lays bare the sore spot in our National Income resources and emphasises in clear terms the imperative necessity for making substantial and sustained efforts to improve our agriculture. We trust that those who have the vision and the imagination to envisage a self-sufficient contented and economically wellbalanced India establishing herself securely in her rightful place among the world's progressive nations, will lose no time in working steadily and earnestly for an efficient and up-to-date Agricultural-revival-policy.

NEED FOR INTERNATIONAL ECONOMIC POLICY

By

A. V. MATTHEW

AT the present time, international uncertainties exist in both the political and economic spheres, and the world's rehabilitation after the last Great War is not yet complete. The economic conditions in almost all countries are now vastly complex and call for immediate development and expansion, especially since the necessities of life continue to be in short supply and their production has not yet reached the expected level. The need of a new economic order as a world factor cannot be over-emphasized until there is reasonable security that one country will not be forced into subservience to another by the threat of economic need. There is no value in any international programme if it is not adjusted to the real economic conditions of the world. At present, economics is passing through a transitional period and is deeply involved in this transition in which an old order of thought and life are passing and a new order is emerging. The resources of all the Common-wealth countries, if properly developed, can help to close the dollar gap. With the help of an international commodity clearing house for the distribution of surplus gains to needy countries, measures can be adopted to stabilise agricultural produce, and effective progress in solving the unemployment problem throughout the world can be made, if properly attempted, in harmonising the policies and purposes of all nations in matters of food, relief and rehabilitation and in providing a monetary basis for world-wide commerce and exchange. While the basis of unreasonable racial, class and national divisions ultimately consists in a way of thinking that fails to accept the democratic categories of modern thought and the relativistic implications contained in them, co-operation possesses a power and influence which, if properly exercised, would be able to transform the world for the better by subduing diverse and conflicting economic, political, social and national interests which even now are pulling very often in opposite directions, and co-operative harmony furthers democracy itself, since co-operative work is an essential function of our democratic civilization.

We cannot expect to establish social, economic or political stability unless the problem of food for the people of the world is first solved. Quick international action in growing more food has now become a necessity, since the uncertainties of the situation in the world in regard to food is increasing. The fundamental economic problem of the present day is how to supply the necessary amount of food to all the people of the world, the importance of which programme should not be judged solely on the profit angle but from the wide angle of total international economy, especially since many countries are still dependent on other countries for their food require-

ments. Dr. Bunting, Chief Scientific Officer of the overseas Food Corporation, recently observed that the world's farms can hardly provide enough food for the 3,00,00,00,000 people who will populate it in 50 years. To quote Lord John Boyd: "Our civilization will become extinct unless nations can learn wisdom and begin to apply the great powers of modern science more and more to develop the earth's resources to provide the food for the people of all countries."

No country can maintain a state of full employment unless it produces and exports satisfactorily. A high balanced level for any country depends on both exports and imports. If all nations decide to relax impracticable policies of self-sufficiency and to secure all possible benefits from international trade, it would not be difficult to increase the wealth of the world and to raise the standard of living of its people, although every nation has a right to acquire such control over its economic policy as would make each branch of production conform to the interests of the nation as a whole, and constructive economic policy requires or implies a theory of national activity, which is comprehensive enough to form a basis for such a policy. In the absence of a substantial international market, it is not possible for any country to develop a large export trade. It was the division of the world into water-tight economic compartments burdened by heavy international debt, both public and private that was mainly responsible for the high tariff quotas and exchange restrictions which have produced the chronic unemployment, the social distress, the revolutionary movements and overthrow of democracies in many countries in Europe since 1920. The more Britain, Australia, New Zealand and other sterling area countries cut dollar imports, the greater will become the unemployment problem in the United States of America, and if the sterling countries buy less from the U. S. A., the present economic crisis will increase. Although in 1947 sixteen European Powers who had accepted the Marshall proposals met in Paris and agreed to draw up plans for concerted economic recovery, it is unfortunate that Soviet Russia intends to destroy the Marshall Plan and to wreck the American sponsored recovery of Europe, actuated by the selfish desire to create chaos in Western Europe, to spread Communist ideas outside her defence zone, and to increase her exploitation of the resources of other countries. Several countries have now devalued their currencies in pursuance of their progressive economic policy to set up exports and to attain a condition of balanced trade with the world. Mr. Dean Acheson, United States Secretary of State suggested some months before that President Truman should, as early as possible, convene a world conference with the object of smoothing out currency difficulties as also to ensure a free flow of trade by the gradual removal of existing restrictions. The International Federation of Agricultural Produce held at Stockholm, some months before, has recommended free exports and imports of farm produce, besides passing a resolution that, (since one of the greatest impediments to this

is the inconvertibility of currencies), there should be more production for enabling payment for goods in goods.

The problem confronting India, as Britain, is how to stimulate their exports to the dollar area. Though India's economic position is sound, our trade balance with Britain, U. S. A. and the rest of the world is adverse. The present improvement in the position of India's balance of payments is mainly due to the devaluation of the Indian rupee and the measures adopted to increase our exports and reduce our imports. The drain on India's Exchequer can be reduced only by regulating our exports and imports in such a way as to help to create an effective employment of the resources of our country, while by reducing food imports from dollar areas, India will be able to pursue her international financial policy unhampered by any fetters of the sterling area. As imports from dollar areas are likely to be costly in the future by about 30 per cent, it has now become necessary for us to effect a regimentation regarding food materials.

The principles of economics must be worked out so that they may be in harmony with an evolutionary world process, especially since economics is now exercising as much influence on politics as theology moulded the course and nature of politics in the sixteenth century and earlier, and there are few problems in modern life which are not related to economics, although men has much beway to make up and much need to atom for their neglect of ethics in the economic sphere. Hence it is a legitimate subject of speculation to consider the relation of morality to the present-day economic problems of the world and how it is likely to influenced human problems in the future. Economics is the sphere in which all of men of all countries can come together, whatever their racial, national, communal and political differences may be, and is the arena where they can work in co-operative harmony so that prosperity, peace, freedom and justice shall be in tolerable balance.

Developments in Dairy Farming.

By
S. GORDON COLLER

Important developments in farming practice, particularly in milk production, have emerged during the Annual Dairy Show in London, attended by more than 65,000 visitors. Supplemented by information gathered by the National Farmers Union about the continuously rising mechanisations of agricultural work, and by the statistics of the Ministry of Agriculture in London, they combine to give a picture of increasing efficiency.

ALL the larger British agricultural shows have for some years been giving a lead to breeders and farmers alike by requiring tubercle and contagious abortion-free tests for all entries, but they are now insisting on a number of production qualifications before a dairy cow can enter the ring. Milk and butter fat records are among these, and the London Dairy Show is now introducing classes for every breed which demand both regular breeding and good production for a number of years. The classes were still in experimental stage at the 1950 show for the judges are having to find a method of awarding prizes which encourages the two equally important characteristics-high production and good conformation.

The importance of these experiments lies in the fact that farmers in Britain have always looked to the agricultural shows for a lead in these matters, and their influence is, therefore, profound. Furthermore, they are in step with the attitude of farmers themselves under present-day conditions, who are placing more emphasis than ever before upon the word 'efficiency' and all that it means in terms of high output at relatively low cost.

Mechanisation is one symptom of this attitude. Not so long ago, when the number of tractors on British farms had multiplied several times over within a few years, experts thought that saturation point had been reached. Events, however, have proved them wrong. Since the beginning of 1948, when agricultural tractors used in England and Wales totalled 2,05,080 and horticultural 26,000, the number has risen to over 2,58,870 in agriculture and 36,400 in horticulture an increase of over 25 per cent in two years. In the same period, the number of tractor trailors has risen from 1,46,000 to 2,21,000, showing how rapidly the horse is being replaced for haulage work. A survey by the National Farmers Union of 2,693 typical farms shows that between 50 and 60 per cent of the dairy farms now possess milking machines, the proportion on the larger farms being over 70 per cent, while most of those classed as arable and mixed also use machinery for this purpose. In two years, the number of farms using main electricity has risen six per cent, while 11 per cent, more farms use electricity power. Taken together, these figures mean that agriculture in Britain remains per acre, by far the most highly mechanised in the world.

Breeding has combined with machinery to increase the efficiency of farming during this period. The number of pedigree breeders has risen from about 9,000 in 1939 to 32,000 in 1949, and 40 per cent of all recorded cows are now pedigree animals. Taken together with the fact that breeding is increasingly for higher yielding animals, this has also had a marked effect on milk production, as has the tremendous educational campaign of the past years on the better use of fodder and feeding-stuffs. The results of these factors on production are no doubt, either as regards quantity or quality. The annual average milk output of recorded cows has risen from 7,559 lb. in 1938 to 7,986 lb. in 1949, this having been achieved despite the fact that over five times as many cows—and therefore many more of poorer quality—are recorded now; and despite the lack of imported high-protein feeding-stuffs.

Milk sales off the farms have risen by 30 per cent, yet only nine per cent, more cows were needed to produce that increase. Again, before the war only seven per cent of Britain's milk output was tuberculin tested standard in 1949 the figure had reached 25 per cent, and by June 1950 it had risen a further five per cent in six months. So rapid is the rate of increase in this field, that figures are out of date almost before they are printed.

Nor must the importance of research be overlooked. The National Institute for Research in Dairying at the University of Reading—one of the largest of those directed by the Agricultural Research Council (a Government-sponsored body)—is making an important contribution to the progress of an industry whose turnover, in the dairying section alone, exceeds Rs. 266. 67 crores) a year. It was this Institute which warned during the war of the serious fall taking place in some herds in the non-fatty solids contents of milk, and pointed to an increase during the winter in the energy content (starch-equivalent) of the cow's diet as one of the remedies. Radio-tractor elements made in one of Britain's atomic piles have seen used in other recent experiments, which show that much of the fat in cow's milk is derived from the acetate circulating in the blood, the acetate being produced by the fermentation of carbohydrates in the rumen. A study of the effect of hormones such as those derived from the pituitary and thyroid glands on the yield and composition of milk has shown that their influence is very marked.

By basic research of this kind, by tests on the efficiency of milking machinery methods of manuring and managing fodder crops, the ripening and flavour of various cheeses, and so on, science is joining with the breeder and engineer in making a continuous increase in the efficiency of dairy farming.

STEAM JET REFRIGERATION

By
V. S. PILLAI B. Sc. (Eng.)

STEAM jet water vapour refrigeration is a modern, simple and safe method of producing refrigeration at temperatures above the freezing point of water (32°F). It is now widely used and possess marked advantages for application, some-what above its minimum possible temperature, provided that sufficient steam and cooling water are available at reasonable cost. The method has been perfected and commercially proved over the past 15 years. It is only comparatively recently that a demand for refrigeration at temperatures above 32°F has arisen. Now comfort cooling, air conditioning and industrial process cooling have come into the picture and have made the water vapour refrigeration cycle commercially attractive.

In this system, water the only refrigerant used, is introduced into an insulated chamber in which a vacuum is maintained so as to cause part of the water to evaporate. The latent heat for that part which evaporates is furnished by the removing of water, which is thereby cooled. The vacuum is maintained by a suitable combination of steam jet ejectors and condensers, the latter either of the barometric or surface type.

Since each pound of water evaporated removes somewhat over 1000 Btu of latent heat, a corresponding number of Btu of sensible heat will be removed from the remaining water which means that for example 100 lbs. will be cooled approximately 10°F. Since each ton of refrigeration produced by any short of refrigeration system means the removal of 12,000 Btu per hour, it is evident that the evaporating of slightly less than 12 lbs. of water per hour is thus equivalent to one ton of refrigeration. The evaporator temperature that will be maintained of course, depends upon the vacuum that is maintained, which in turn depends on the work that is accomplished by the ejector condenser system. To operate such a system the only utilities required are steam for the ejector, cooling water for the condensers and steam or electricity for the cooled water and condenser pumps.

HOW THE SYSTEM WORKS:

The water vapour refrigeration cycle is similar to the vapour compression cycle using a chemical refrigerant, except that the physical properties of water and water vapour make high pressures unnecessary. At the same time, the water evaporated to produce the refrigeration effect is normally not reused. The pressure involved in a refrigeration unit of this type is far below atmosphere.

It is not possible for water to remain a liquid if the pressure over it is reduced to less than its vapour pressure. Thus if water at some temperature higher than 50°F is introduced into a closed chamber in which the pressure is maintained at 0·363" Hgal. (29·637 in Hg. vacuum

referred to a 30" barometer) part of the water will splash into steam. Since each pound of water evaporated absorbs heat from the remaining water equal to the latent heat of steam at the evaporated pressure, the water which remains is cooled to an equivalent amount.

Thus in a commercial unit, if 240 gpm. of water at 60°F (1,20,000 lbs/hr.) is introduced into an insulated evaporator or flash chamber in which the pressure is maintained at 0·363" Hgals. part of the water will evaporate, cooling the reminder to 50°F. The quantity of water which will be evaporated is equivalent to the total heat removed, that is 10 Btu/lbs. (10°F cooling) times 1,20,000 lbs. per hour divided by latent heat of evaporation or lbs. per hour evaporated: 10 x 1,20,000/1065 : 1130 lbs/hr.

This 1130 lbs. per hour of water evaporated is less than 1 % of the water introduced to the evaporator and its loss is compensated for automatically by a liquid level controller valve which adds water to the evaporator from some external source. Since 1 ton of refrigeration is equal to 1,20,000 Btu/hr. the actual refrigeration tonnage produced in this example is equal to 100 tons at 50°F chilled water temperature.

In order to maintain the required low evaporated pressure, so that continuous cooling may take place, the vapour evaporated must be continuously and efficiently removed. This is accomplished by a vapour booster ejector, which is the heart of this type of refrigeration unit. It removes the vapour evaporated in the flash chamber and compresses it to a higher pressure at which it is condensed in the booster condenser. With normal condensing water temperature, the booster condenser pressure may be from 1½ to 2½" Hgal. The optimum condenser pressure depends on the relative cost or availability of steam and condensing water and the temperature of the condensing water.

All of the vapour plus the quantity of steam required for the booster ejector stage, is condensed in the booster condenser. Since the condenser operates under vacuum some form of air removal equipment is needed to purge it of the air. This usually consists of a small two stage air ejector which requires only a relatively small fraction of the steam and water needed for the booster ejector and the booster condenser.

Although a steam jet refrigeration unit requires more cooling water than a system employing a chemical refrigerant, it has advantage of its own which will often dictate its use where temperatures of say 35°F or higher can be used. Assuring adequate quantity and reasonable costs for steam and cooling water, some of the advantageous characteristics may be lised as follows:

1. No moving parts except pumps-hence low maintenance and supervisory costs, a low spare parts inventry, a high degree of reliability, no noise or vibration.
2. Can easily be controlled automatically, requires practically no attention, and can adjust steam and water consumption to the required load.
3. Since water is the refrigerant, there is neither refrigerant ha-

zard nor cost. Pressures are low, much below atmosphere.

4. Low initial cost, installation cost and operating cost. In fact waste low pressure steam can frequently be used and the warmed cooling water from the condenser can be used for the process.
5. Units are easy to start and shut down.
6. These give high overload capacity with only slight increase in cold water temperature which is desirable for quick start as well as overload.
7. Units are exceptionally economical at high chilled water temperatures, the economy increasing with the temperature.
8. Units can be installed out-door.
9. Pumps can be turbine driven.

The number and variety of applications of the jet refrigeration system are:

Rubber processors produce cold water at 50°F to cool rubber rolls and mixers. In this way they assure quality and maintain production inspite of seasonal variations in local water temperature.

Many process industries use steam jet refrigeration units to produce cold water for circulating through tubular heat exchangers used to cool solutions, water, oil, gases etc.

Pulp mills use jet refrigerators to produce 50° water since it will absorb 50% more SO_2 than 75° water. When water is employed to absorb gas it is usually an advantage to be able to use cold water and so increase the absorption.

With adequate water and steam at reasonable cost the steam jet refrigeration method is well suited to comfort cooling and air conditioning because of the economical water temperature that can be used and freedom from hazards.

THE USE OF SUPERPHOSPHATE IN INDIA.

IF man has been able to remedy Nature's whims as far as rain is concerned, on the other hand, he has done almost nothing yet for providing his cultures with a good alimentation. Therefore, although Indian agricultural production is very high on the whole, yields are far from being satisfactory. It would be quite a different story if farmers were to complete the very slight amount of manure they give to their plants by wise applications of chemical fertilisers.

As a matter of fact, Indian agriculture has begun to have recourse to nitric fertilisers—particularly sulphate of ammonia—which has a very much apparent action on the vegetation. But the soils of the Indian continent, as by the way almost all other soils, contain only a very small quantity of phosphoric acid, and one must add that this very small content exists in a form which the plants cannot assimilate easily, and which is unsuitable for intensive cultivation.

Therefore the yields obtained when nitric mineral fertilisers only are used can hardly compare with those recorded when phosphated fertilisers are employed.

Nitrogen–Phosphoric Biochemical Solidarity.

Besides, there is a very close biochemical solidarity between nitrogen/phosphoric acid proportion which has given the best results for wheat in India, when fertiliser experiments took place, there is between 2.5 and 3 parts of phosphoric acid for 1 part of nitrogen, that is to say: when one uses 40 lbs. of nitrogen per acre, one must employ also at least 100 lbs. of phosphoric acid, i.e. 550 lbs. of superphosphate 18%.

The proportion for cultures which require a small quantity of phosphoric acid seems to be 2 parts phosphoric acid for 1 part nitrogen.

In order to illustrate the solidarity existing between these two elements, let us mention the results of test on wheat effected in India and quoted by V. G. Panse, M. D. Dansawate and S. D. Bokil.

Conversely, as it should actually be expected, when the superphosphate is used without nitrogen, the increases in weight are often not very important in comparison with pilot cultures without fertilisers.

Superphosphate for India the best phosphatic fertilisers.

The climate as well as the physical conditions of the soil being generally very favourable for a rapid growth of the Indian vegetation, it is obviously to the *superphosphate*, the most assimilable of all phosphatic fertilisers, that one must have recourse in order to provide the plants with the phosphoric acid they require.

Superphasphate considered from an economic standpoint.

Superphosphate is by far the most widely used fertiliser in the

world. Its consumption is approaching that of all other mineral fertilisers put together. France, on account of her extremely important North African phosphate resources, occupies in Europe a privileged position, being the largest European producer of superphosphate, and has been producing and consuming superphosphate for more than 70 years.

In order to give a figurative idea of the French consumption (which at present is approximately 15,00,000 tons per year), let us say that, between 1900 and the second World War, agriculture has used half a milliard of metric quintals (metric quintal = 220 lbs.) which, loaded on 10 ton wagons, would make up a train extending one and a half time round the world.

Superphosphate properties.

One can take the superphosphate as being a mixture of monocalcium phosphate, soluble in water and very assimilable by plants, and calcium sulphate (or plaster), the latter providing the plants with the sulphur and calcium they require.

As soon as the superphosphate is mixed with the soil, its phosphoric acid is dissolved and is fixed by the absorbing powder.

Its efficiency does not decrease in time.

Therefore:

1. *It is not lost in draining waters*, even when the ground is flooded (ricefields for instance).

2. *It can be applied in large quantities.* What is not absorbed by one culture is absorbed by the cultures which follow.

Use of the superphosphate in India.

We have seen that its phosphoric acid is not very much mobile in the ground. Therefore it must be buried in the area which later on will contain the greatest quantity of absorbing rootlets. It is thus necessary to bury it deeply, the depth varying obviously according to the root system of the plants. Generally, it is buried by means of the deepest ploughing done before sowing or planting the culture for which it is intended.

Quantities of superphosphate to be used in India.

The quantity is of course dependent upon the productive capacity of the culture. A plant which can yield much in the conditions under which it is cultivated must of course be fed much more abundantly than another which is bound to vegetate because it grows for instance in a barren soil and in too dry a climate.

Indian soils being nearly always well constituted physically, the quantity of superphosphate to be used depends first and foremost upon the quantity of water available for the culture.

One must distinguish two main cases:

1. *Districts irrigated* or having a satisfactory rainfall as regards the abundance and distribution of the rain,

It is recommended to apply between 400 and 600 lbs. of superphosphate per acre according to circumstances.

Nitrogenous manures when they have reached the nitrate stage of assimilation travel readily in soil water, the movement being entirely always downwards, so that under Indian conditions when sowing is just about 2"–3" deep there is every chance of the nitrogen being wasted. There is consequently no point in ploughing down quick-acting nitrogeneous fertilisers. In fact, care must be taken to prevent them from being washed away, before the plant is in its active growth. This can be achieved by limiting the initial dozes of highly soluble nitrogeneous fertilisers and supplementing it by heavier top-dressings, where-ever necessary. On the other hand, the behaviour of water-soluble phosphates and potash in the soils is quite different. These materials are closely held in the surface soil and travel downwards slowly, phosphate in particular being very firmly fixed on the top soil. For shallow root crops therefore, this is probably of little account, but for deep rooting plants or in case of deep sowing, the ploughing in of the mineral fertilisers would be of advantage.

Although germinating seeds are very sensitive to contact with soluble fertilisers, the young plant needs a ready supply of plant food near at hand during growing stages. Supply of manure therefore should not be distributed uniformly over the ground but should be concentrated at suitable points from the seedling in what is termed "fertilisation in the row." Many experiments on this subject are in progress in the United States and it is claimed that the correct location of the fertiliser in relation to seed by concentrating it into two hands, one on each side of the seed row, has usually proved to be the most effective method.

The dominant factors in determining fertility are not only the composition of the soil but also the physical condition, tilth, drainage, beneficial soil organisms and other minor factors. All the same it is not so much governed by the combined effect of all the controlling factors as by the influence of one decisive feature. In other words, the crop yield is determined by the deficiency of one single element rather than the sufficiency or the super abundance of others and maximum that the maximum crop results. It is very important therefore that whatever be the fertiliser or fertilisers used, they should be suitably mixed up to give a *balanced manure* as required by each type of crop.

EARTH WITH ITS STORE-MONAZITE.

By

Dr. C. S. VENKATESWARAN

MOTHER Earth is the treasure house of infinite source of power. In this mechanised age of civilization, man's progress in the art of living depends largely on the sources of power at his disposal. The early sources of power consisted of wood, charcoal, water-mill and the animal. About two hundred and fifty years ago, the discovery of the smelting of iron by coal instead of coke was made; this was the starting point of the great coal industry. The invention of the steam-engine by James Watt in 1769 was followed by the ever-increasing demand for steam-power in transport and in the factory. The generation of steam by using coal became universal practice and this led to the rapid expansion of the coal industry. Coal had the unrivalled monopoly of place as a source of power for nearly hundred years, till the discovery of the internal combustion engine in 1879. This discovery gave birth to a new and more efficient source of power. The first oil well was sunk in Pittsburg only about 100 years ago; but by 1900 the world production of oil was 20 million tons and today it has increased to 500 million tons. The discovery of the internal combustion engine and its rapid expansion changed considerably the technical and social pattern of the world, as its predecessor, the steam engine, did a hundred years ago. Man was given a new nobility in life and he was led to the conquest of air and space.

Energy is the 'go' of all things. The discovery of a new and more powerful source of energy always marked a new mile-stone in the history of modern materialistic civilization. Yet another mile-stone in the onward march of progress was laid at the close of the last world war by the discovery of nuclear energy. The discoveries in the sub-atomic world, by famous men of science, Thompson, Max Planck, Rutherford, Niels, Bohar, Einstein, Fermi and others gave a new insight into the nature of matter and energy. These discoveries changed profoundly our understanding of the processes of nature and taught us that the nucleus—the heart of all atoms—is the seat of immense power and that this power is released as useful energy in the breaking up or fission of heavy nucleus. The first release of nuclear energy on Hiroshima nearly five years ago has made world history. The atomic fuel used in the production of nuclear energy is about a million times more powerful than the best grade petrol or diesel oil, and hence its great importance as a potential source of limitless power. The chief element used as atomic fuel is uranium; but thorium mixed with uranium also serves as a very efficient fuel.

This new discovery has made uranium and thorium-bearing minerals, which were comparatively unimportant about five years ago, suddenly assume tremendous importance in the affairs of the world.

Monazite, is the source of thorium, one of the fissible materials likely to be used for atomic energy. The name monazi means unique mineral. It occurs in the form of small crystals embedded in the older rocks and several ores widely distributed in the crust. But these sources are of very little commercial value as the percentage of the mineral in them is very low and hence it is unprofitable to extract the mineral from them. By far the most important source of this mineral is the monazite sands that occur extensively in several parts of the world, but in South Carolina and in the State of Travancore–Cochin. An interesting story is told about the manner of the discovery of Travancore Monazite. Sometimes in 1909, some yellow sand, heavier than usual was found in a store-house of coir in Germany. An examination of the sand soon disclosed that it was monazite. The sourse of coir and hence of the sand was traced to Travancore. German enterprise was not slow in exploring the coasts and setting up a prospecting and mining factory at Manavalakurichi.

Monazite in these sands is in the form of round grains, and the deposits are found in the mouth of rivers. The shape and location suggest that the deposits have been formed through ages by a process of weathering of monazite-bearing rocks and the grains of the rock so released are rolled to and fro by streams of water and tidal waves of the sea. The colour of the sand varies from light yellow to yellowish green, brown and red. Its specific gravity lies betwern 4.9 to 5.3 and harness between 5 and 5.5. The crystallities are in certain samples transparent and possess very high refractive indices of the order of about 1.8.

Monazite is a rich source of several rare earths, especially Cerium, Yettrium and Lanthanam, which exist as ortho-phosphates. It contains invariably some amount of thorium. The value of the mineral depends on its thorium content. The percentage of thorium varies from one to about fifteen according to the place of occurence. The rest of the mineral is made up of sillica and small quantities of lime, magnesia and other metallic oxides and an appreciable quantity of occuluded helium and sometimes lead. Helium and lead are the disintegration products of the radio-active products of the radio-active thorium. From the percentage of lead and thorium, it is possible to estimate the age of the rocks which form the source of the mineral and hence of the earth.

The beach deposits of Travancore are very extensive and on a conservative estimate, about two million tons of monazite can be mined. These deposits are covered by two regions: the first is situated around Manavalakurichi near the mouth of the stream Valliar and forms the northern coast of the bay between Colachel and Kadiapatnam and the second, which was discovered later, extends from Neendakara to Kayamkulam. The Manavalakurichi deposits were worked by a German Company from 1911 to the beginning of the first World War. At the outbreak of the War, the factory passed into the hands of the

British and began functioning as a limited company. Another factory was started at Chavara soon after Neendakara deposits were discovered. The mineral companies were paying royalties to the Government on minerals exported by them. The strategic and industrial importance of the mineral was fully realised by the close of the Second World War and the Government terminated the leases or rather the leases expired and the Government came to a new arrangement with the companies by which they became the agents of the Government for working the sands. In June 1949, one of the major companies was purchased by the Government and worked as a State Industry.

The Travancore sands contain monazite admixed with ilmenite, zircon, sillimanite, rutile, garnet and quartz. The average composition of good deposits is 75–80% ilmenite, 4–6% zircon, 2–4% sillimanite, 3–5% rutile, 3–5% garnet, nearly one per cent monazite and the rest silica. The monazite itself contains about 12% thorium, 30–32 per cent cerium, 15% Lanthanum oxide and the rest phosphoric oxide, helium and mesothorium form one part in a million. The problem of extracting thorium from the sands consists in the first stage, of separating monazite from the deposits and in the second stage, of treating the mineral for obtaining its various constituents. The first part, namely concentrating monazite, is done in the mining factories situated at the source. So far the material after mining was exported from our country for the manufacture of thorium, cerium and other components. Recently, under the joint auspices of the Central Government and the State Government, a Monazite Factory has been started at Alwaye and it is hoped that the processing and production of the vital materials from this mineral will begin in the near future.

Now I may briefly indicate the methods adopted for the mining of monazite from the beach-sands. Three processes are in use for effecting the concentration, namely 1. Wet, 2. Dry-blowing and 3. Electro magnetic. In the wet process, the sand is subjected to gravity separation on what is called Wilfley tables. The sand is fed into a hopper by means of a moving belt and thence on to one corner of a rectangular table which is kept shaken by a machine. A continuous stream of water is kept flowing along with the sand and the grains are sorted out, according to specific gravity, into different places. In dry-blowing, a blast of air instead of the stream of water is used: the different minerals being separated into zones according to their specific gravity and brushed off by expert workmen into different boxes. These methods result in a partial separation of the minerals constituting the sand. The partly concentrated monazite is further concentrated by special types of separators. The most efficient and widely used machine is the electro-magnetic separator. The principle employed in this method is that the magnetic susceptibility of the different constituents of the sand is very different and therefore they are attracted by magnetic fields to different extents. In usual fraction four magnetic fields which increase in intensity in successive steps are traversed by the sand. In the first, the strongly, magnetic materials, the magnetic, ilmenite and the large fragments of garnet are removed; the second removes the finer grains of ilmenite and garnet; the third collects the coarser particles of monazite and the last, the finer monazite, zircon, rutile and silica

pass on. The sand falls on a broad, horizontally moving belt over wedge-shaped magnet poles beneath. As the sand passes on, the fraction attracted by the magnet is collected in a vessel and the remaining part moves on and drops on the next belt. By a careful adjustment of the strength of the magnetic fields, 97 to 99 per cent concentration of monazite is obtained. A modification of the above electro-magnetic separator, in which three magnetic fields are made to give the performance of six fields, is used in the factories of Travancore. It may also be mentioned here that rutile, which is left behind, is a valuable mineral used in the titanium industry and its separation is effected by electrostatic methods. Zircon and ilmenite are also very valuable bye-products of the industry.

Monazite is used mainly as a source of thorium and cerium compounds. Thorium nitrate is used in the manufacture of gas mantles. In fact, it is the demand of the mantle industry that stimulated the development of the manufacture of thorium on a commercial scale. The mantles are prepared by dipping pear-shaped fabrics knit out of artificial silk in a solution of 99 per cent thorium nitrate and 1 per cent cerium nitrate, dried in air and ironed out into shape. On heating in a flame, the fibre burns off and leaves a skeleton of the oxides of thorium and cerium, which is incandescent and emits white light rich in infra-red, at high temperatures. Thorium is also used in radio industry in the manufacture of thoriated tungsten filament tubes.

Thorium is radio-active and its disintegration products like meso-thorium and radio-thorium possess great activity and are used in radiology. Meso-thorium is used in the manufacture of luminous paints.

As already mentioned, the potentialities of thorium industry are very great. Its use for large-scale manufacture of atomic energy is still in the experimental stage. Thorium is not as readily fissile as uranium; but partial success has been reported in converting thorium by neutron bombardment into plutonium, the wonder element discovered during the last war. Ere long it may be hoped that thorium piles similar to uranium piles will be perfected and used at least as small power units.

Besides thorium, the cerium earths have found use in the production of pyrophoric alloys which are utilized in the manufacture of automatic gas-lighters and for indicating the paths of bullets and shells—the so-called tracer bullets. They also find numerous applications in aluminium industry, in textile industry for producing variegated colours, and in medicine. Didymium salts are used in the manufacture of marking inks and dyes. The phosphatic content of the mineral, if properly extracted can be utilized as manure. This is of special significance to the state as we are in short supply in sources of phosphorus.

The beach-sands of Travancore are nature's bounty to India. A proper exploitation and effective utilization of the sand will no doubt give tremendous fillip to our nascent industries.

SHARK LIVER INDUSTRY STILL HAS A FUTURE

THIS article by K. W. Anderson of the Commonwealth Scientific and Industrial Research Organisation, Division of Food Preservation, is reproduced from Fisheries News-letter published by Australia's Director of Fisheries.

Reports from overseas have confirmed previous accounts of the production of synthetic Vitamin A on a commercial scale, and it is of interest to analyse the possible effect of this achievement on the Australian shark liver oil industry. Before attempting this, let me briefly review the industry's development.

Cod liver oil had been used as a therapeutic agent for about a hundred years before it was first reported in 1915 that it contained a specific ingredient necessary for the growth of laboratory animals. This growth factor was subsequently isolated and, following the recognition of the importance in human nutrition of certain chemical substances—vitamins—it was named Vitamin A. About 1930 the liver of the halibut was found to be a particularly good source of Vitamin A and later the livers of certain sharks also were found to be rich in this vitamin.

VITAMIN FROM SHARKS.

Prior to 1940 the livers of some Australian sharks had been shown to contain appreciable quantities of the vitamin, and in that year the Australian industry was founded, stimulated by the cessation of imported supplies of cod liver oil and by the growing demand for concentrated sources of Vitamin A to fortify foodstuffs and rations for the fighting services. Australian imports of cod liver oil had amounted to 80,000 gallons per annum. By 1945 one Victorian firm alone had produced over 2,00,000 gallons of a substitute product, as well as considerable quantities of high potency concentrates.

With the end of the War, attention turned to satisfying the demand from a vitamin-conscious public and the product was incorporated, after suitable processing, into medicinals, foodstuffs and veterinary feeding emulsions. It is safe to say that the industry reached a production peak in the few following years when the supply of livers from the limited economical fishing grounds was barely adequate for the demand. Processors competed eagerly for supplies and the price paid to fishermen rose from 9 pence per lb. to as much as 4 shillings 6 pence per lb. for good quality livers. Economic considerations, increasing competition offered by overseas medicinals, and the fact that Vitamin A therapy has now tended to take its true relative position as a therapeutic agent against specific deficiency diseases in the medicinal field have rapidly decreased the demand and today liver prices have stabilised around the former figure of 9 pence per lb.

SYNTHESISED.

During this period, scientists the world over had worked on the problem of the chemical structure of Vitamin A and of synthesising it. The first question was solved by a

team of Swiss chemists in 1933 and attention turned to the latter project. By 1945 many compounds similar, or closely allied, to Vitamin A had been produced in the laboratory.

The most promising of these synthetics were selected and investigation resolved around simplifying the chemical reactions involved and finding cheaper alternative raw materials for their manufacture.

From then on it was only a question of time, and at least three American firms are now producing synthetic Vitamin A at a cost which compares favourably with the production of concentrates from fish liver oils; i. e. approx. 2 shillings 6 pence per million units or roughly £ 60 per lb. of the pure vitamin. With increased production and improved process efficiency, there can be no doubt that this cost will ultimately be further reduced.

How will this affect our industry in Australia? To understand this we must realise the unquestioned advantages of the synthetic product. It is crystalline and easily handled, is relatively stable, practically odourless and in the concentration normally used almost tasteless, and it is of standardised purity and potency. It lends itself readily to incorporation into medicinals and foodstuffs and will eventually replace the oily concentrates, prepared from liver oils, for such uses.

Some allowance can be made for the fact that its impact will be some-what delayed by the inability of Australian manufacturers to buy from dollar areas, but there are indications that it will eventually be available from alternative sterling sources.

THERE IS HOPE

A ray of hope can be held out in connection with the veterinary emulsions previously mentioned. These emulsions invariably consist of an approximately 50 – 50 ratio of shark liver oil, containing the vitamin, and water, since it has been shown that such a medium is particularly suited to the effective utilisation of the fatsoluble vitamins by the animal.

The present world shortage, and high price, of suitable edible oils means that using synthetic Vitamin A, the price of the oil necessary as a carrier or solvent could add as much as 50 per cent to the cost of production even were it available in sufficient quantity. The naturally-extracted vitamin is obtained already dissolved in a carrier oil and merely requires blending to a standard concentration before emulsification.

Such spectacular success has attended the use of this type of preparation by stock breeders and poultry farmers that there is today an appreciable demand for it. Provided this demand is maintained, there is, therefore, reason to believe that a steady supply of shark livers will still be sought by Australian processors.

It is fortunate that our shark fishing industry is largely centred around the Victorian coastline for there is in that State a considerable sale of shark flesh as food. The livers have always been a secondary consideration among shark fishermen a sort of by-product that has helped to defray the running expenses and upkeep of boat and crew.

Sugar & The Chemical Industry

From our London Engineering Correspondent.

AN extremely interesting lecture, entitled "The Basis of Life", was recently delivered by Oliver Lyle before the Sixth Annual General Meeting of the North-Western Branch of the Institution of Chemical Engineers in Manchester.

The lecturer described how the whole of vegetable life is based on sugar; the whole of animal life is parasitic on vegetable life, and the whole of civilised life is based on oil and coal which were reduced from sugar, and drew the conclusion that sugar is the most important substance in the world. He stated that the sugar industry was the birth-place and/or kindergarten of much of the most important chemical process plants.

The chief plant originating in and developed by the sugar industry is perhaps the roller mill, the true origin of which is not known, although it may have been used in India or China for centuries before we have any historical record of it. It is known, however, that the first roller mill was installed in Europe by Pietro Speciale in Sicily in 1449, for crushing sugarcane, and after that date there are many records of roller mills for crushing sugarcane wherever it was grown.

The first roller mills were pieces of tree trunk geared together by crude peg teeth and driven in various ways, by human labour, horses, oxen, water wheels, wind wheels and eventually the steam engine. By 1650 the wooden roller was being shod with iron shells, and by about 1720 the wooden core had disappeared, having been replaced by the hollow iron core. For the first 300 years of the roller mill's life the rollers were arranged with their axes vertical, but about 200 years ago Smeaton made a horizontal mill for a sugar factory in Jamaica. For centuries also the rollers worked in pairs, but in 1794 mills in sets of three horizontal rollers made their appearance and soon became standard. Roller mills crush approximately 12,00,00,000 tons of sugarcane a year, and it is only recently that this type of mill has been used for other purposes, such as flour grinding, in place of the former flat stones.

The next great development evolved by the sugar industry was the art of evaporation, and incidentally the evaporation of sugarcane juice has been known for some thousands of years. Nearly 2,000 years ago, for example, Pliny described sugar as being white and brittle, and the early evaporators were shallow earthenware pans with a fire beneath them.

About 1650 there appeared the first indications of the search for thermal efficiency, in the shape of the evaporator train or "copper wall", which consisted of a row of shallow pans, about five in number, set on a long flue with a fire at one end. The gradually thickening juice was ladled from pan to pan until in the

last one nearest the fire crystallization took place. This arrangement, besides being economical in fuel, gave the greatest temperature difference where the heat transfer was lowest.

The use of steam for evaporation, although suggested about 1690, did not come into actual use until soon after 1800, when all kinds of evaporators were invented, many of them consisting of partly immersed rotating heating elements supplied with steam through a glanded trunnion, being the first film evaporators.

The greatest invention in this field was undoubtedly the vacuum pan for evaporation in vacuo, invented by the Hon. Edward Charles Howard, who was probably the greatest sugar refiner of all time. Howard's patent of 1813 describes the relation between pressure and boiling point and how the state of the boiling contents can be judged by their temperature. The thermometer is described as being encased in a metal tube, the space between bulb and tube being filled with mercury. The patent also describes the proof stick, the most valuable device in use to-day, whereby a sample of the pan's contents can be withdrawn against the vacuum. Howard was also the first man to isolate fulminate of mercury and to establish the celestial origin of meteorites.

The next great invention, which could not have come to life without the vacuum evaporator, was the multiple effect evaporator, which must be ranked in thermodynamical importance with James Watt's invention of the separate condenser. There is some doubt as to the identity of the first and true inventor, but it is known that the first man to build and work successfully the first true multiple effect evaporator was Norbert Rillieux, who was born in New Orleans in 1806. He completed his education in France but later returned to the United States and carried out experiments there. Before multiple evaporation was introduced, sugar mills had to burn fuel in large quantities in excess of the exhausted cane fibre or bagasse, which meant an ever-increasing radius of forest round the mill. To-day of course a cane sugar factory has no need to be thermally economical because with multiple effect evaporation the bagasse is usually more than sufficient. The position, however, is very different in the beet sugar industry, to which Rillieux' invention has given a new lease of life.

Next the sugar industry developed the combined generation of power and process heating with the same steam, the first true combined power and process plant being built in Jamaica by John Stewart in 1768. He supplied his cane driving mill engine with vapour from the evaporating train at atmospheric pressure to the Newcomen cylinder of the engine. The replacement of Newcomen engines by Watt engines with their increasing pressures caused the sequence of the use of the steam to be reversed. Rillieux' patents show engine exhaust as the steam supply to the first effect, but an emergency supply from the boiler is also provided.

Filtration on an industrial scale was largely developed by the sugar industry, and in this connection the lecturer described the use of Kieselguhr and other filter-aids and defecants, including lime, activated carbon and bone charcoal, and concluded his very interesting discourse with references to the origin and evolution of centrifugal machines or hydro-extractors, which occupy a very important place in the sugar industry of to-day.

FACTS THAT INTEREST

They specialise in intricate machines.

An Australian engineering company in Melbourne, Victoria, specialises in the manufacture and design of intricate machines. Among these is a series of cardboard box making machines, such as benders, conveyors and rotary benders. Another widely different type of product is a boiler level gauge which has a pressure of 2,000 lb. to the square inch.

Another of its lines is a 'pack-rack' for motor cars. This comprises a framework which fits sungly to the top of any car or truck to transport luggage or goods. It fits to the top of the car by means of rubber suction buttons, and can easily be placed in position or removed without marking the car's polished surface.

New paper-making equipment put in:

Represented to be the largest paper-making enterprise in the Southern Hemisphere, the newsprint mills at Boyer, Tasmania, recently installed new huge paper manufacturing equipment. When he inspected the mills recently, the Premier of Tasmania, Mr. R. Cosgrove, said that between 6,00,00,000 and 7,00,00,000 ft. of Tasmanian timber will soon be used at the mill. This timber will produce newsprint worth £A40,00,000. The controlling company has invested between £A30,00,000 and £A40,00,000 in the enterprise.

Machine sows pure seed only.

An advanced type of seeding machine for use by farmers, is among the many engineering products manufactured by an Australian company in Carlton, Victoria. The machine ensures that the seed to be sown is 100 per cent pure.

A large number of the machines have been used by clover growers in Western Australia. They have varying angles in the sieves, and the exhaust winnowing fan can be easily and speedily adjusted.

Other equipment which is made by the company includes the entire machinery for equipping a flour mill, and all machinery for milled food products, such as oatmeal, pearl, barley, and split peas.

Cooking gear made by hand.

In spite of modern mass-production methods in the manufacture of metal cooking utensils, an Australian firm in Sydney continues to manufacture copper items solely by hand-made technique.

The firm has been in business for 26 years, and makes confectioners' rolling and tilling pans, varnish kettles, coils and tanks, and soda water carbonators and coolers.

Most of these items require curved and rounded surfaces to which the malleable copper lends itself readily. To obtain smooth and polished surfaces the copper is stretched, shrunk and hammered. When the required shape is obtained the metal is hammered for maximum durability.

Aircraft widely used in mineral exploration.

Much use is made of aircraft in Australian mineral exploration. The Zinc Corporation, for example, one of the major companies on the famous Broken Hill silver-lead field in Western New South Wales, has its own fleet of Douglas C47's and other aircraft.

If the Corporation wants a quick survey of an area, it loads a 'jeep' into a plane and flies it to perhaps some old military airstrip. Quick examination of the area is made. The party is then flown back to have assays made—all within a few days.

Lac Cultivation Methods:

The Governing Body of the Indian Lac Cess Committee, which met in Calcutta recently approved a scheme for intensive demonstration of improved methods of lac cultivation for a period of three years in the lac growing States of Bihar, West Bengal, Uttar Pradesh and Madhya Pradesh. The Committee authorized the president to pay Rs. 15,000 towards the cost of trade publicity in the U. S. A. when the American Bleached Shellac Manufacturers' Association draw up their programme of publicity for 1951.

Sugar for Fruit Products:

According to a recent press note, the Government of India has decided that allotments of sugar and tin-plate to licensed manufacturers of fruit products will be made by the various state governments, to which ad hoc quotas will be given. Licences under the Fruit Products Order, 1948, are already being issued by the state governments.

U. S. Experiments to Improve Rubber Yield:

One thousand rubber-producing hevea trees under cultivation in New Jersey are beginning to furnish data that will help planters in the Far East improve their rubber crops. Scientists working on the project, which is sponsored by the U. S. Rubber Company, are trying to find ways to start the trees producing earlier than they do now. They are also working to get a larger yield, to prolong the life of the trees, and to reduce the loss of trees from disease. The hot, steamy climate in which the hevea tree thrives is created artificially in greenhouses, and experiments with various soil conditions and chemical treatments are constantly being made. The scientific data is sent to the U. S. Rubber Company's main plantations in the Far East. The American company has raised the average yield of rubber from 400 to 950 pounds per acre in Malaya.

Penicillin Manufacture

The scheme for the manufacture of penicillin, sulpha and antimalarial drugs is estimated to cost Rs. 3·5 crores (51 per cent of which will be contributed by the Government of India and 49 per cent by the Government of Bombay). A site near Poona has been selected for the factory. The production capacity of the proposed factory will be 3.6 million mega units of penicillin, 1,40,000 lbs. of sulpha drugs and 1,00,000 lbs of antimalarial drugs per annum. The factory is expected to go into production some time towards the end of 1952.

The United Nations International Children's Emergency Fund was approached for assistance to the extent of $10,00,000 for the purchase of plant and machinery, most of which may have to be purchased from the hard currency areas. In response to this, the U. N. I. C. E. F. has allocated $8,50,000 for equipment and the World Health Organisation have allocated $3,50,000 from their Technical Assistance Fund for providing necessary technical staff for the training of Indian personnel in the manufacture of penicillin. The acceptance of this grant, however, precludes Government from entering into any agreement with a commercial firm for the use of their secret processes in the manufacture of penicillin. The question whether this grant should be accepted is under consideration at present.

In order to meet the immediate requirements of penicillin, it has been decided to set up a plant for bottling penicillin imported in bulk from abroad. For housing this plant a building is being constructed in the compound of the Haffkine Institute, Bombay, at a cost of Rs. 1 lakh. The building is expected to be ready soon and it is hoped that the bottling of penicillin will be started from February, 1951. The capacity of this plant will be 1.5 million mega units per annum.

Consumption of Petrol.

The consumption of petrol by private consumers has been increasing steadily since the derationing on October 22 in the States. In November, it registered an overall increase of 12.1% and in December, of 26.1% over October. In certain areas, the increase has been 40% over that of the rationing period.

Withdrawal of petrol rationing will result in an annual saving of about Rs. 4 lakhs to the Central Government, which had to contribute towards the cost of administration of rationing schemes in the States. Uttar Pradesh, the only State now to continue rationing, does not receive any grants from the Centre for the purpose.

Sugar Production.

The opening stock, production, dispatches and the closing stock of sugar in India during the fortnight ending Jan. 31, were 88,06,000 mds., 37,09,000 mds., 10,55,000 mds. and 1,14,59,000 mds. respectively, against 65,63,000 mds., 37,16,000 mds., 12,12,000 mds. and 90,67,000 mds. respectively for the corresponding fortnight of the previous season, says a Press-note. The production and dispatches of sugar since Nov. 1, 1950, are reported to be 1,48,96,000 mds. and 53,34,000 mds. respectively as against the corresponding figures of 1,25,31,000 mds. and 44,91,000 mds., during the previous season. Production of sugar for the season 1950-51 prior to Nov. 1950, amounted to 86,000 maunds.

Eight thousand tons of foreign sugar are reported to have arrived in Madras and stored by the Government, says the sugar market weekly report of the Indian Institute of Sugar Technology, Kanpur, for the week ended March 3. Open market rate for sugar was quoted at Rs. 60 per maund, at Meerut, and at Rs. 66 to 68 per maund at Bhagalpur. Calcutta experienced sharp rise in wholesale and in retail prices. Controlled average prices of sugar per maund were Rs. 33 at Ambala, Rs. 33/12/- at Delhi and Meerut, Rs. 34/6/- at Kanpur, Rs. 32/8/- at Bhagalpur, Rs. 34/9/- at Calcutta, Rs. 34/7/- at Madras and Rs. 31/0/- at Bombay. Average prices per maund of sugar were Rs. 18/8/- at Ambala, Rs. 34/4/- at Delhi, Rs. 20/8/- at Meerut, Rs. 20/8/- at Kanpur, Rs. 22 at Calcutta and Rs. 31/13/- at Bombay. Average prices of Khandsari sugar per maund were: Rs. 32 at Ambala, Rs 45 at Delhi and Meerut and Rs. 40 at Kanpur.

The official index at 424.1 (with the year ended August 1939 as 100) showed a slight fall of 0.1 p. c. during the week ended February 24. As compared with corresponding weeks of last month and a year ago, the index was higher by 1.8 per cent respectively. The average for February worked out to 423.4 as compared with 414.3 for the previous month and 392.3 for February, 1950.

News & Notes

Cost of Living Survey.

India's cost of living which has gone up three times the pre-war (1937) figure has risen more rapidly than in Australia, Germany, South Africa, United Kingdom and United States according to United Nations statistics.

The rise in prices in India has been far less than in Greece, Indo-China, Italy and Siam—all countries where there have been political upheavals with consequent repercussions on the economy.

Economy-controlled Britain has been the most successful in preventing increase in prices, while the greatest increase has taken place in Greece where conditions of hyper-Inflation prevail.

Food prices in India have risen more rapidly than the general cost of living and are now about three and a half times the pre-war level. In Australia, Germany and the United Kingdom, the rises in the cost of living and food prices have been almost identical; while in Canada, U. S. A. and South Africa, like in India, the food prices since 1937 have risen more rapidly than the general cost of living.

In India the wholesale prices have increased four and a quarter times, the prices of raw materials over five times, and finished goods about three and a half times the 1937 prices, according to the U. N. Statistics.

While the cost of living in India is now three times what it used to be in 1937, in Australia during that time it has increased by 75 per cent in Canada and the United States by 70 per cent in South Africa by almost 65 per cent Germany by nearly 50 per cent and the United Kingdom by a mere 14 per cent.

Among the countries where the cost of living has risen more rapidly than in India since 1937 are Burma where it is now four and a half times the pre-war level, and Indo-China where it is 40 times as high. In Italy it has risen 48 times and in Thailand about 12 times what it was in 1937. In Greece the prices have risen to fantastic heights—for they are now 290 times the pre-war figure.

Since 1937, food prices in Canada are twice as high. They have also doubled in the United States and are about 30 per cent higher than the general cost of living prices. In Greece the food prices are now about 350 times, in Italy 58 times, in Indo-China 38 times, and in Indonesia about 14 times what they used to be in 1937.

Indian wholesale prices which had doubled by 1943, had trebled by 1948, and quadrupled by July, 1950. The wholesale prices here have risen more rapidly than in Australia, Canada, Germany, Netherlands, Norway, Switzerland, United States and United Kingdom. They have risen less rapidly since 1937 than in France, Indo-China, Italy and Japan. Compared to 1937 wholesale prices are twice as high in Canada, Australia and U. S. A., two and a half times in Britain, 20 times in Indo-China, 23 times in France, 52 times in Italy and 201 times in Japan.

Customs Revenue.

According to the returns received in the Department of Commercial Intelligence and Statistics, the total gross sea and lands customs revenue collected in the Indian Union, during the month of February amounted to

Rs. 1,694 lakhs. Of this, import duties accounted for Rs. 1009 lakhs, export duties for Rs. 653 lakhs and land customs and miscellaneous for Rs. 32 lakhs. The total gross collection of Union Excise duties on motor spirit, kerosene, sugar and matches amounted to Rs. 454 lakhs during the same month.

Land Reclamation.

Mr. Munshi stated in Parliament that it is the intention of the Government to reclaim 3 million acres of kans-intested land with the help of 345 tractors in a period of seven years beginning with 1950. One hundred and fifty tractors were accordingly purchased for use during 1950 and an additional 60 for use in 1951. During the 1950 season only 140 tractors could, however, be put into operation as the remaining ten were received too late. All the 210 tractors are working this season. The total area reclaimed with the help of these tractors up to February 28, was 76,728 acres. In addition, another 1,55,542 acres had been reclaimed with the help of old tractors taken over from U. S. Army surpluses in 1946. Also, 6,53,000 acres of waste land had been reclaimed by the Central Tractor Organization and the State Governments in 1949-50.

Industrial Projects.

The Commerce and Industry Minister said in Parliament that in the first three years of independence, 88 industrial projects with foreign participation were finalized and five were rejected. The total capital applied for was Rs. 23.60 crores out of which Rs. 10.47 crores was to be contributed by foreigners. The terms and conditions of foreign participation in all these cases were that the major interest in ownership and effective control in such companies would be in the hands of Indians and that Indians would be trained in the respective industries at their principal factories in India or abroad. Other considerations were that the companies must have definite manufacturing programmes and that the foreign participants should fully co-operate with the Indian firms in giving them technical assistance.

Industrial Development in Pakistan.

It is reported that the Pakistan Government propcses to spend Rs. 50 crores on industrial projects during the next two years as part of Pakistan's six-year development plan, which in turn is part of the Colombo Plan for the development of South and South-East Asia. Under the plan, Pakistan proposes to set up cotton textile mills, jute mills, steel melting and rerolling mills and cement production units. It also envisages development of Pakistan's mercantile marine, installation of power plants and installation of tele-communications and a telephone plant. Pakistan's full six-year development plan is estimated to cost Rs. 260 crores.

Lignite Ores in South Arcot.

The lignite (coal) ores occurring in the South Arcot district are considered to be the best in the world by German geological experts. The Madras Government has sent samples to Germany for opinion regarding the quality of the ores. It is estimated that 500 million tons of lignite are available in South Arcot. The State Government is now actively exploring the economic exploitation of the ore.

Experimental Salt Farm:

Common salt with a high percentage of purity has been produced in the experimental farm at Wadala, Bombay, under the auspices of the Council of Scientific and Industrial Research. This farm which has been operating for the last two years under the technical guidance of the Salt

Research Committee set up by the Council has manufactured so far 31,000 maunds of white, good quality common salt. The primary cost of production of salt at Wadala has been worked out at Re. 0-11-3 per maund which is almost the same as the cost of indigenous product. Experiments are being continued with a view to effecting a further reduction in the cost.

Progress in Plastics.

Production of synthetic plastics in the United States totalled 2000 million pounds in 1950, which is 500 million pounds more than in 1949. Production of plastics now exceeds that of such well known materials as aluminium, copper, zinc, lead and rubber.

Imports of Iron and Steel.

Mr. Hare Krushna Mahatab said in Parliament that the target of import of iron and steel fixed by India for 1951 is 5,00,000 tons, but it is doubtful whether India would be able to get even half of it. The imports of iron and steel from European countries represented 85 per cent in 1950 and amounted to 2,38,000 tons. Since the Korean War prices have increased by 80 per cent in the U. S. A., 100 per cent in Japan and aboot 80 per cent in the U. K. and the Continent.

Spain's Foreign Trade.

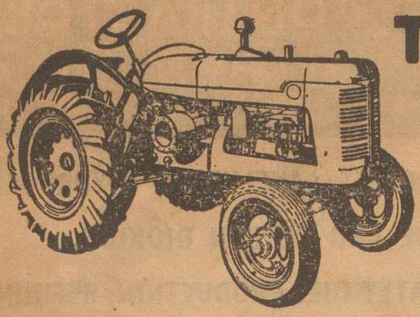
The trade deficit of Spain during the first eleven months of 1950 at 20·6 million gold pesetas showed a steep fall from 208·5 million pesetas in the corresponding period of the previous year. The decline in the adverse balance was mainly due to the increase in exports of raw materials like lead, pyrites, ironore, blende and mercury.

Standards for Carpets.

The Wool Sectional Committee of the Indian Standards Institution has produced the draft Indian standard specification for handloom carpets for exports made at Mirzapur and Bhadhobi. The draft prescribes constructional details, in respect of the warp, weft, pile and knots of the lowest currency and soft currency areas. It also specifies the quality of yarn to be used.

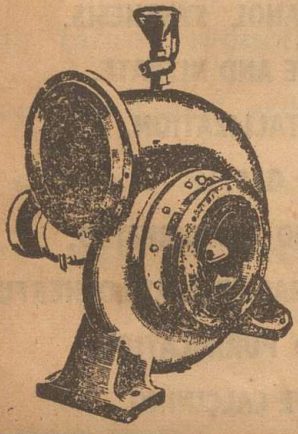
Telephone Industries.

The Indian Telephone Industries Ltd. has been set up by the Government for running a factory for the manufacture of automatic telephone and carrier equipment. It is the only factory of its kind in India. It is now being worked as a private limited company in which about 90 per cent of the share capital is held by the Governments of India and Mysore. The remaining share capital, roughly 10 per cent, has been allotted to Automatic Telephone and Electric Company Ltd. of England in the form of free shares under the terms of the agreement between the Government of India and the Company. The provision of Rs. 65 lakhs made in the budget will be utilised for the purchase of further shares in the Company. The capital thus made available to the Company will be utilised by it for financing its building programme; purchase and installation of machinery and for equipping the factory. The factory is expected to go into full production during 1953-54 after which no further investment will be necessary. Pending the manufacture of complete telephones in India, the assembly of telephone instruments is being undertaken from parts obtained from England. The total number of telephones assembled up to the end of December, 1950 was 25,258. Production programme has been drawn up, and steps are being taken to accelerate production. The factory has already started manufacturing some of the parts.



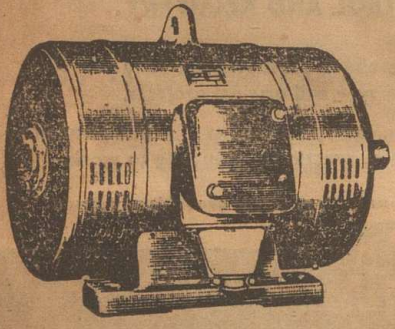
TRACTORS

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

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Sri. R. Chakravarthi our resident Representative at New Delhi, visited Rome early this year. Here he is seen (near the calendar) in the midst of some Italian businessmen.

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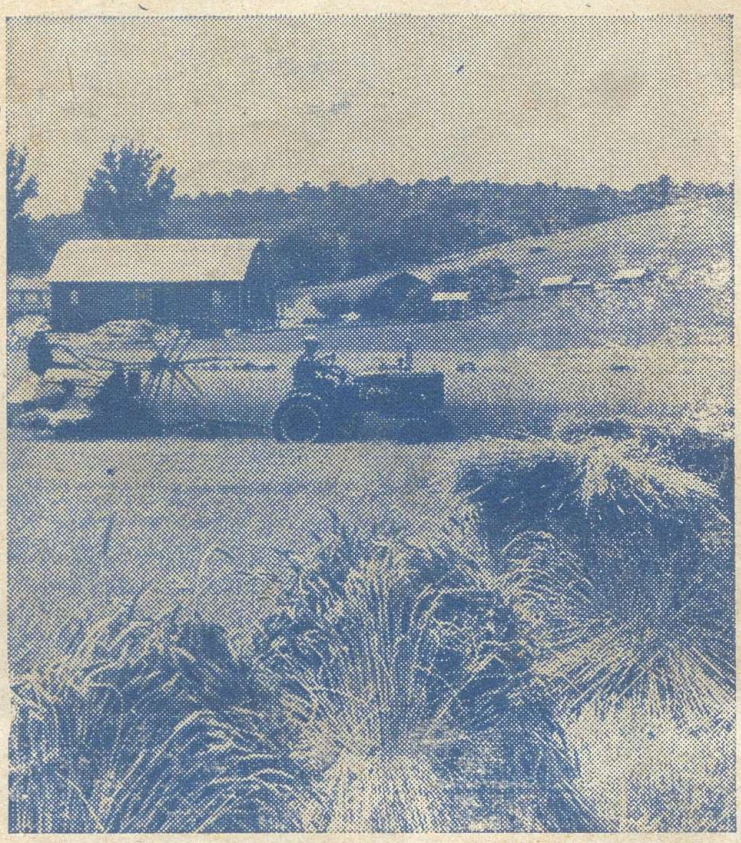

Efficiency of the small farmer and the increased use of farm machinery make possible continued high yields from United States farms. During the past 10 years the number of farm workers has decreased about 10 percent. But by using more tractors, threshing machines, mowers, mechanical corn and cotton pickers, and other machines. United States farmers have increased their production nearly 25 percent. Here a farmer in the State of Pennsylvania cuts his wheat

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