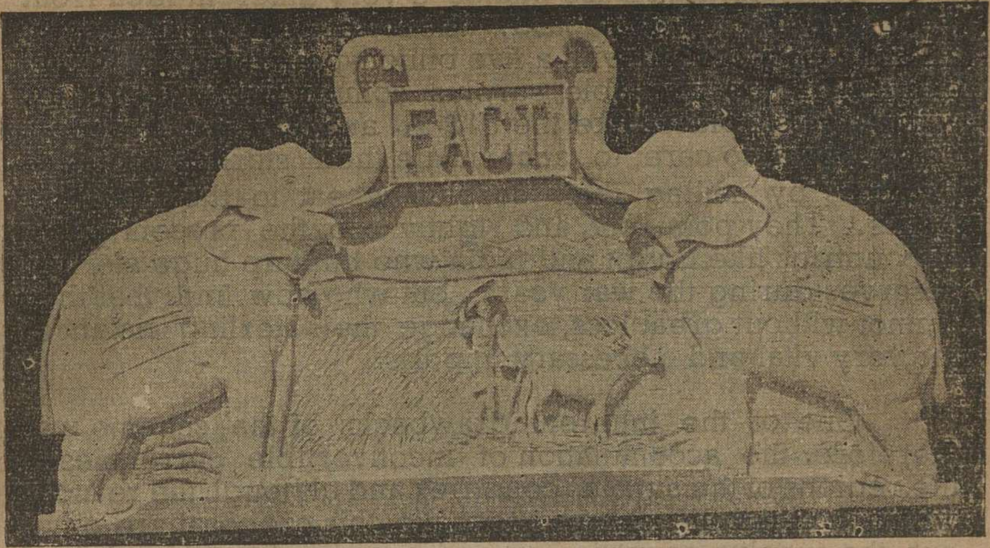

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EDITORIAL

DISTRIBUTION OF FOOD SURPLUSES.

THE annual session of the Food and Agricultural Organisation was held at Washington last month when a proposal for a World Clearing House of Commodity surpluses was discussed at length. The scheme was one prepared by six world Experts. It included a solution for the currency difficulties now standing in the way of deficit countries from purchasing food stuffs from those having a surplus to spare. But the countries with such surpluses did not view the proposals with any favour and the discussions proved to be as difficult for an agreed settlement as the question of Atomic Control.

Lord Boyd Orr, when he was Director General of the F. A. O. had sponsored the idea of a World Food Board which was planned to function as a World Organisation with the sanction of all the governments behind it. Its aims were to help increase food production in the overcrowded countries, to build up World granaries for the storing of food surpluses for utilisation in lean years, and to bring about stability in food prices taking into consideration the interests of both the producer and the consumer. The project, provided all the Governments of the World agreed, was a good one, and although it received the support of the majority of Government delegations in principle, was quietly put on the shelf.

The clearing House plan is a very different idea from that of the World Food Board. It envisages the formation of a Public Corporation with a five billion pound capital to buy and sell all the available surplus commodities. Countries with large surpluses like the U. S. A. and Canada, however, do not seem to care, to accumulate their sterling or rupee balances by selling their surplus wheat to the Clearing House. They point out, and rightly too, the present plight of countries like Egypt and India who built up huge sterling reserves during the war years, but who now find that they cannot without great loss, exchange their sterling balances for very vital and necessary imports.

One of the inherent drawbacks of the scheme was therefore, the accumulation of inconvertible currencies in the regions of the surplus countries and although the reasons which induced the experts to make this proposal are obvious, the surplus countries were in no mood to take a broad view of the situation, and wait for their price till such time as the deficit countries improved their Dollar position unequivocally. In the meantime wheat or other surplus commodity is accumulating in these countries unsold, and unless they found a satisfactory market, this would unsettle their trade eventually. A solution on the lines of Lend-Lease, looks a possible way out. This could of course be worked out if not for all countries, at least for countries like India which have some staple export like jute to offer to the World market.

In the scheme of Lord Boyd Orr, the promotion of food production in the backward countries is duly emphasised. This certainly deserves greater attention than the disposal of surpluses to advantage. The Clearing House proposal has no suggestion to offer for promoting food production and this is a serious flaw in the newer scheme. Any plan which does not involve the raising of the levels of agricultural and industrial production in the backward countries is not going to bring in World Prosperity or World Peace. And any international action or programme based on considerations other than increased production and balanced distribution of Food is not likely to be a panacea for our present ills.

Editorial Board.

FOOD PROBLEM

By

A. V. MATHEW, B. A., B. L.

THE present period is a very exciting and important one in economic thought. Though economic liberty has degenerated into economic libertinism in many countries and the economic conditions in almost all countries are now vastly complex and call for immediate development and expansion, economics has something of the key-importance for politics today that theology had in the sixteenth century and earlier, since now the problem of the social, political and economic influence of democracy is whether those countries where democracy prevails will set themselves to create the atmosphere and circumstances out of which real progress in all spheres of human activity can be achieved.

In our own time we find, admittedly on the economic level, a renewed attention to the claims and potentialities of economics. The world of economics is now such a complicated organisation with so many ramifications that it is necessary to devote particular attention to the economic needs of man. The amazing advances in scientific discovery and invention are parallelled by so much misery. Variation in economic beliefs changes the course of events Soviet Russia and some other nations are making plans to increase their exploitation of the resources of other countries, although at the moment there is a general consensus of opinion that internationalism should be supported to the greatest possible extent. Many people welcome, with tempestuous eagerness, revolutionary ideologies, which are represented or rather misrepresented to be secrets of human happiness.

H. G. Wells in his book, History of the World, says: "It becomes more and more clearly manifest that a huge work of reconstruction has to be done by mankind if a crescendo of such convulsions and world massacres as that of the great war is to be averted. No such hasty improvisation as the League of Nations, no patched-up system of conferences between this group of States and that which change nothing with an air of settling everything, will meet the complex political needs of the new age that lies before us. A systematic development and a systematic application of the science of human relationship, of personal and group psychology, of financial and economic science and of education, sciences still only in their infancy, is required. Narrow and absolute, dead and dying moral and political ideas have to be replaced by a clearer and a simpler conception of the common origins and destinies of our kind."

Food has an inevitability of its own as a stern reality and as a force which powerfully grips and vitalises the minds and actions of men. The justification for food is

to be found in what it stands for as an elemental fact in human life, profoundly modifying all the activities of men and the relation of men toward each other. The time-honoured principle of food is rooted deep in the history of man. Age after age man has derived sustenance and happiness from food, which is essential for sustaining the spirit of man as he goes about the ways of this strange and moving world, where philosophies and views of the world are changing and fresh insights, novel convictions and new judgments are arising regarding the rightness and wrongness of human relations in racial, national and international spheres, war, politics, economics, capital and labour, and production and distribution of goods.

The fact of the world scarcity of food insistently demands recognition. Social, political and economic dangers arise when the majority of the countries of the world stand in need of food, as at present when only very few countries like the United States of America, Australia, New Zealand, Denmark, Norway and Switzerland produce enough foodgrains for their own requirements and without being put to the necessity of importing food from outside. The world's food crisis to-day may be attributed to the growth of population, failure to use proper manure and seeds and to the lack of transportation caused by wartime destruction of railroads, highways, bridges, ports, docks, canals, ships, trucks and trams. To quote H. H. Hutcheson: "The rapid growth of population, which is characteristic of most undeveloped countries, has more than offset such gains as have been made in productive capacity and efficiency. The basic difficulty every Government must face is the marked lack of balance between population, which may increase rapidly, and resources that are deficient in many important particulars."

The present food production of the world is 7 per cent less than during the last Great War. For the first half of this year, the Food and Agricultural organisation made the world rice allocation, amounting to 18,75,300 metric tons, which was an increase of 75.000 tons over the corresponding period of 1948, though representing only 45 per cent of the amount of rice which the claimant countries imported prior to the last Great War. Only one-tenth of the land in the world is now used for cultivation. Because of poor production, poor distribution and unscientific methods of agriculture, millions in the world are undernourished. Food should be made available in sufficient quantities as also cheap enough for the common man who is, as a rule, poverty-stricken.

Lord Boyd-Orr, former Director-General of the United Nations Food and Agricultural Organisation, to whom the Nobel Peace Prize has very recently been awarded, said a few days before: "I think the Award is in connection with my proposal to all Governments for a world food plan which would get the Governments to co-operate in a concrete plan to double food production, and to bring contentment to the people who are in revolt against their hunger and poverty.

The United States supported it, and France fought it to the last ditch. India fought for it, and the majority of countries wanted it. I believe it will come, and it will be a first step to world co-operation, to a world of plenty and of prosperity, which is the only foundation for a world of peace."

It is necessary for the economic progress of India that the programme of increasing our food production, which is a laudable venture should be carried out vigorously. While the average production per acre in Japan is valued at Rs. 150 per year, it is only Rs. 25 per acre in India. Subsequent to partition, India has to maintain 78 per cent of her original area under rice and 71 per cent under wheat. Though 85 per cent of the people of India are engaged in agriculture, we are still not selfsupporting in the matter of our food. We cannot expect to restore our balance of trade unless we attain self-sufficiency in food-grains as early as possible, Production is India's only solution to the shortage in food.

ജനസംഖ്യയിലുള്ള വിപുലമായ വദ്ധനവു്, യുദ്ധപരിതസ്ഥിതികളിൽ, വിളഭൂമികൾ, ഗതാഗതമാർഗ്ഗങ്ങളായ കപ്പൽ, ട്രാം, ട്രക്ക് മുതലായ വാഹനങ്ങൾ, തുടങ്ങിയവ അമിതമായി നശിപ്പിക്കപ്പെട്ട വസ്തുത, ഇവയെല്ലാമാണ് ഇന്നത്തെ ലോകവ്യാപകമായ ഭക്ഷ്യക്ഷാമത്തിൻെറ പിറകിലുള്ളകാരണങ്ങൾ. ഇൻഡ്യയ്ക്കു് അത്യാവശ്യമായ ഭക്ഷണസാധനങ്ങൾ സ്വയം ഉല്പാദിപ്പിക്കുക, എന്നല്ലാതെ മററു പോംവഴിയൊന്നുമില്ല. 'ഭക്ഷ്യപ്രശ്നം' എന്ന ഈ ലേഖനത്തിൽ ശ്രീ എ. വി. മാത്യു ഇങ്ങനെയാണ് അഭിപ്രായപ്പെട്ടിരിക്കുന്നതു്.

Do things for others and you will never be lonely.

—Scott Pearson.

The wisest man is generally he who thinks himself the least so.

—Boileau.

DEFICIENCIES IN MINOR ELEMENTS CAUSE CROP DISEASES.

By
MARUDARAJAN, B. A.

CROP plants remove considerable amounts of mineral nutrients from the soil during their life. A small percentage of these may be returned to the soil by the disintegration of those parts left in the soil. But the major proportion contained in stem, leaves, fruits and seeds does not come back at least to the same place. Consequently replenishment of the loss is necessary.' For this purpose manures have to be applied to the cropped areas. Knowledge of the nutritional requirements of plants have undergone change in recent years. At one time it was thought that the plants were in need of only ten essential elements for growth. Recent work especially during the last three decades has however resulted in the development of our knowledge of the part played by various other elements in the life of the plants and has led to the addition of more elements under this category. These later additions are usually termed as "minor elements" "trace element" or "micronutrients" and have been found to be equally essential though they are required only in extremely small quantities. Though the role of these elements fall within the realm of physiological studies, the absence or deficiencies of these elements lead to the development of pathological symptoms of crop plants and these are of considerable interest to the plant pathologist. Furthermore there is more information of the pathological aspect of these trace elements than their physiological functions.

In our province a certain amount of investigation of the pathological aspect of some of these elements has been made by the mycology section and the results are included hereunder.

One of the trace elements whose deficiency has been exhibited by disease symptoms in plants is boron. During the World War II intensive cultivation of vegetables was undertaken on the Nilgiris for the benefit of the army. Extensive areas were under turnip, beet root, cauliflower and cabbage. The turnips, beet roots and cauliflowers grown in some localities near Ootacamund developed certain pathological symptoms. The core of the root in turnip was soft and presented a discoloured water-soaked appearance (water core) instead of being white and hard. In beets the crowm was often found rotten, blackened and the young leaves at the top were also involved. The cauliflowers in some fields did not develop the normal creamy curd but had poor flowers of varying shades of brown. Pathogenic organisms were not present in the affected portions. Similar symptoms on these crops have been described from other countries as being caused by boron deficiency. The only way

to test this was by supplying the deficiency. With the co-operation of one of the leading ryots of Ootacamund, field experiments were conducted for over two seasons, for the control of water core of turnips. Boron was applied to the soil in the form of boric acid a few days before sowing at the rate of five, ten, fifteen and twenty pounds per acre. Spray inoculation of a 0·2 per cent solution of boric acid on the foliage was also tried. An examination of the tubers from the various plots showed that all the treated plots had very little or no symptoms of the disease and that spray application was as affective as application to the soil. Thus it was proved that boron deficiency was responsible for the symptoms of water core of turnips. Based on these experiments the ryot was advised to broadcast 5 pounds of boric acid per acre. It is also concluded that the pathological symptoms observed on beet roots and cauliflower must be due to the same cause, and boric acid application will be beneficial.

Boron deficiency affects growth of many other crops also. Excess of boron is however toxic to plants and this has to be borne in mind in recommending the dosage of the element to be applied.

Zinc is another minor element whose deficiency in the soil or non-availability to the plant is evident in many parts of the province. Orange trees in several districts of the plains exhibit symptoms of zinc deficiency. The growth of the tree is arrested. The leaves develop yellow blotches between the veins presenting a characteristic mottled appearance. The leaves become progressively smaller; fruits are produced and in course of time the tree deteriorates and falls a prey to other pathogens.

There are two ways of supplying this deficiency, either by application of zinc sulphate to the soil or by the spray application on the foliage. Addition of zinc sulphate to the soil was done by placing it in holes 9 inches deep all round the tree or by broadcasting the salt over the soil round the trees and working it in. Both these methods failed to produce any response in the trees. The spray application was next tried. The composition of the spray fluid was varied according to the intensity of symptoms. In trees which had initial stages of deficiency symptoms zinc sulphate-lime mixture of the formula of 5–2½–100 was used and in more severe chronic instances the formula 10–5–100 was followed. Zinc sulphate was dissolved in water in one vessel. In another bigger vessel the lime was slaked and later diluted with the required quantity of water. The zinc sulphate solution was poured into the lime solution and stirred. The resulting mixture was sprayed on the foliage. The best period for spraying is when the trees are putting forth new flush of leaves. Two applications are necessary in a year and these can be adjusted with reference to the flushing period in each locality. It is better not to spray when the trees are in flower. Experience in America and in our Province has shown that there is no harm when the trees with fruits on are sprayed provided the mixture is correctly prepared (neutralised). The response is much

quicker when the spray is made on young foliage than on old ones. Application of large quantities of farm yard manure in addition to the spray will also be beneficial. Zinc salts may be present in the soil but do not become available to the plants and that is the reason why soil applications do not produce any response. The results of these experiments have been given wide publicity and several orange growers are regularly spraying the trees with zinc sulphate. The department had arranged to distribute over 5 tons of zinc sulphate in 1947 and larger amounts are being used at present.

Another minor element whose deficiency has been found to produce pathological symptoms is copper. Citrus plants readily exhibit the deficiency of this element. The disease known as 'Exanthema' or 'one form of die back' is due to this. In the initial stages of copper deficiency the young branches are frequently angular and 'S' shaped with multiple buds instead of being round with usually one bud as in normal plants. In acute stages the twigs begin to die back and gum pockets develop at the leaf bases. The branches may be covered with brown gummy excrescences and ultimately defoliation takes place. The rind of the fruit also may exhibit hard brown excrescenses.

Spraying the trees with Bordeaux mixture has resulted in marked response and the disappearance of the symptoms. Bordeaux mixture is sprayed on orange trees for protection against several diseases and this treatment serves also for making good the copper deficiency. Copper sulphate can be applied to the soil also with good effect about half to two pounds per tree being used either separately or mixed with other fertilisers. It is common experience in many orange gardens that by spraying Bordeaux mixture the production has been increased even in the absence of fungal diseases. It should however be mentioned that the "die-back" caused by lack of copper should not be confused with the one caused by other causes like root damage, shallow soil over hard pan, poor drainage, over irrigation etc.

For some years past a decline of orange trees has been prevalent in the submontane tracts of Shevaroys, Kotagiri and Coorg. In Kukal and Shevroys, mottling and chlorosis of the leaves become apparent and gradual defoliation results. At first it was thought that this might be due to deficiencies of zinc or iron. Experiments were conducted at Yercaud to note the effect of spraying the foliage with zinc sulphate, iron, sulphate and manganese sulphate individually and in combination. But there was very little response.

In Kukal valley also it was surmised that the trees were not getting all the nutrient requirements. The soil from the base of the affected and apparently healthy trees were analysed with the help of the Government Agricultural Chemist. The figures showed that the soil in the neighbourhood of the diseased trees had less of phosphorous. The response from the application of this manure was reported to be incomplete.

It is now known that diagnostic soil analyses for trace elements have been little developed. Visual symptoms of mineral deficiencies exhibited by plants specially orange, sometimes overlap and it is sometimes difficult to state what particular element is wanting from these symptoms. In such cases one has to try cultivation of indicator plants of resort to plant analysis. The latter method has been recognised as a quicker and reliable method and in the present day the composition of the plant tissues as revealed by plant analysis is known to give a correct picture of the nutritional status of the plants. The analysis of the plant material can be made either by the usual time-consuming laboratory method or by the spectographic method.

It was thought that the spectrographic analyses of leaf samples of equal age from the diseased and healthy plants from Kukal may give a correct picture of the situation. With this idea Dr. Patwardhan, Director of the Nutrition Research Laboratories, Coonoor was approached to extend his co-operation as he was in posssessions of a spectrograph. He readily consented to give all help.

Representative samples of the leaves were taken from the garden of Mr. N. B. Athrey of Kodeneri Estate and he was very enthusiastic in rendering all help in solving the problem. With the kind help of the Government Agricultural Chemist the samples were converted into ash and taken to Coonoor for the analysis. Dr. De the Assistant Chemist, helped in the analysis. Several readings were made. It was clear from the spectrograph that the leaves from diseased plants had deficiencies of several elements when compared to healthy ones. Zinc was absent in all specimens. The leaves from affected trees exhibited deficiency of phosphorous, magnesium, manganese and boron whereas no differences could be made out between the two with regard to calcium and iron.

It is clear from the analysis of the leaves that the trees are lacking in several nutrients. There is agreement between the soil and leaf analyses in the matter of phosphorus. But the deficiencies of manganese, boron, magnesium and zinc (in all cases) which have been revealed by the leaf analysis could not be easily made out in soil analysis. Furthermore the minerals may be present in the soil but may not be available to the trees. Citrus trees are known to grow well at pH 7 but very often the nutrient substance do not become available to the plants from the soil at this reaction. The soil at Kodeneri estate was found to have a reaction in the neighbourhood of pH 7. Moreover lack of boron has been reported to inhibit absorption of phosphates from the soil. So it is quite possible that the trees are not able to obtain their requirements from the soil due to these causes.

In Florida where deficiencies of various elements have been observed in orange gardens a new techinque is being employed for replenishment of the nutrients, i. e., by spraying a combination mixture of phosphorus, potassium, magnasium, manganese

boron etc., instead of applying these to the soil for quick response. It has been decided to try this method at Kukal. Mr. Athrey has agreed to place his garden at our disposal for the conduct of these experiments and we thank him for it.

The usefulness of leaf analysis in determining the nutritional requirements of crop plants is brought out by these experiments. This method of tackling some of the diseases has been attempted for the first time in this province not only in the case of orange but also in the case of arecanut. A spectrograph however is essential for this type of work as one cannot be always troubling other institutions for this. I understand that sanction has recently been accorded for purchasing one for this institute. Various undiagnosed troubles without any associated pathogens occur in many crop plants and fruit trees e. g., areca, orange, plums, vegetables etc. The analyses of plant parts may often help in solving some of these problems and a quick and efficient method of doing this is by the spectrographic analysis.

Summary. Several pathological symptoms caused by deficiencies of minor elements have been observed in this province. Boron deficiency causes water core of turnips and crown rot of beets on the Nilgiris. Mottling of orange leaves due to deficiency of zinc is prevalent in many Districts. 'Exanthema' of citrus is caused by copper deficiency. Methods of supplying these deficiencies are described.

Recently a decline of oranges is Kotagiri, Yercaud and other hilly Districts has been attributed to deficiencies of several elements including zinc, manganese and boron. This was revealed by spectrographic analysis of plant tissues with a view to obtain a correct estimate of the nutritional status of the plants.

(The Madras Agricultural Journal.)

‘ചില ചില്ലറ ധാതുക്കളുടെ അഭാവം കൊണ്ടു് സസ്യങ്ങൾക്കു വരുന്ന രോഗങ്ങൾ’ എന്ന ഈ ലേഖനം, മദ്രാസ് പ്രവിശ്യയിലെ ഒരു കൃഷി ഉദ്യോഗസ്ഥനായ ശ്രീ. മരുതരാജൻ ബി. എ. എഴുതിയതാണ്. ബോറോൺ, നാകം, ചെമ്പ്, ഇവ ചെടികളുടെ വളർച്ചയ്ക്കു് അത്യാവശ്യമായി കരുതപ്പെട്ടിട്ടില്ലായിരുന്നു. എന്നാൽ, ടർണിപ്പു് സസ്യത്തിനും, മധുരനാരങ്ങയ്ക്കും, വടുകപ്പുളിനാരങ്ങയ്ക്കും, ഇതുപോലുള്ള ചില ധാതുക്കൾ വളർച്ചയ്ക്കും, സുഖസ്ഥിതിയ്ക്കും അത്യാവശ്യമെന്നു് പരീക്ഷണങ്ങളാൽ തെളിഞ്ഞിരിക്കുന്നു.

To be angry is to revenge the fault of others upon ourselves.

—Pope-

Measurements of Oxygen in Gases

By
N. D. GOPINATH,

ALL industrial processes and engineering works involve the measurement and control of physical quantities. Industrial instrumentation has become a vital part in any chemical industry. Processes developed in research laboratories when translated to industrial scale require accurate controlling of variables to acquire maximum efficiency in production and quality of the product. Temperature, humidity, pressure, liquid level, flow of materials, speed, strength of liquids, purity of gases and pH are some of the most outstanding variables which one has to deal or control in modern industrial plants. Devices constructed to record these quantities with automatic recorders, and other mechanisms are innumerable in modern industries. It is proposed to discuss in detail the various methods employed for analysing and recording oxygen which is the most difficult constituent of a gas mixture to analyse automatically. Universally, gas analysers make use of the difference in the thermal conductivity of gases, rise in temperature due to catalytic reactions, electro conductivity methods, and infra red absorption. Although several methods are employed quite successfully in analysing oxygen, they seem to give erratic results when the percentage of the combustible constituents in that gas alters. This has been solved quite successfully by the I. G. Farben Industry, Germany. They developed in recent times, the magnetic oxygen recorder where the paramagnetic property of oxygen as against other gases is made use of. This type of oxygen recorder will be dealt with here. Through the measurement of oxygen content of fuel gases improvements in the efficiency of plant operations, combustion efficiency and thereby substantial fuel economy can be achieved.

I. Changes in the polarisation e. m. f of electrodes.

Inert gases or combustible gases containing oxygen are allowed to flow through the detector cell, essentially a primary cell with metallic and carbon electrodes immersed in the electrolyte. The sample to be analysed usually passes through the hollow carbon electrode of the detector cell. The hydrogen evolved at the carbon electrode effects polarisation of the cell, and thus reduces the voltage and current in the circuit. Oxygen from the sample diffuses through the wall of the carbon electrode and combines with hydrogen thus producing depolarisation. Consequently, the more oxygen the sample contains the higher the e. m. f. and electric current produced by the cell.

By a special type of electrode construction and complicated electric circuit, the amount of deflection is made proportional to the oxygen concentration of the sample. The output of the detector cell is affected

by variations in the cell temperature. To compensate for this, the cell unit is placed inside a thermostatically controlled water bath at about a temperature of 40°C. A zero adjusting device is usually provided to correct for inaccuracies arising out of the impurities in the carbon electrode while testing the inert gas. When acid gases are present, these will have to be removed by scrubbing as they would affect the result considerably.

Technical difficulties due to gradual decrease in the strength of the electrolyte, formation of thin films on the active surface of the carbon electrode are often encountered. To correct for this a duplicate cell is provided with the equipment so that while one cell is being cleaned and adjusted, the duplicate cell records oxygen without any interference to the operations. The method though accurate is too difficult in practice and requires careful attention.

2. Catalytic combustion method.

Measured quantities of gas samples and a vapourised standard liquid fuel like oxene are maintained at a constant flow by internal regulating valves and fuel capillaries over a noble metal catalyst filament. The filament is maintained at constant temperature by a thermostatic controlled bath by catalytic combustion, at a temperature proportional to the oxygen content of the sample. The filament forms one arm of an A.C. wheatstone measuring bridge. Any unbalance in the circuit is magnified through electronic amplification. The electronic circuit controls a motor driven circuit to maintain continuous balance in the measuring current. The recorder is calibrated to read the percentage purity of sample directly. An oxygen content of .05% can be recorded within a few seconds depending upon the length of the sample line. The meters are provided with automatic controllers and alarm contacts.

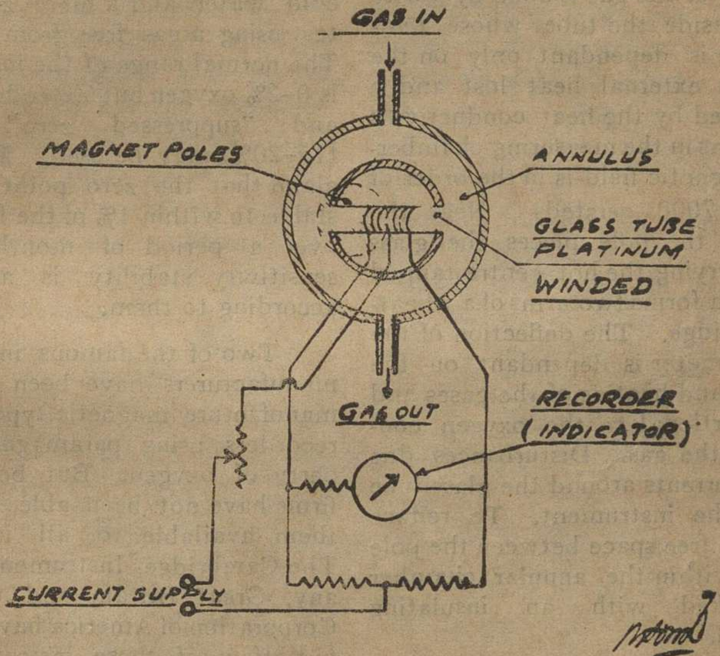
3. Heat Reaction type.

Small quantities of oxygen present in inert gases, CO_2, H_2, N_2 or saturated hydro-carbons can be detected and measured by absorption, the rise in temperature of the gas sample which will result from the combination of oxygen with hydrogen. Except in gases, which do not contain hydrogen as an impurity, pure hydrogen is generated in a self contained electrolytic cell and mixed with the sample. After passing through dehydrator, activated carbon etc. the sample enters the calorimeter containing the catalyst. Oxygen combines with hydrogen. The heat liberated, is directly proportional to the concentration of oxygen in the sample. The amount of hydrogen present in the sample or added should always be in excess of that required to combine with the maximum percentage of oxygen which is in the sample. A sensitive thermopile with cold junction in the gas stream ahead of the catalyst and the hot junction in the gas stream merging from the catalyst chamber indicates the temperature rise in the gas caused by catalytic reaction. There exists a linear relationship between the e. m. f. generated by the pile

and the percentage of oxygen present in the sample. By reversing the cell circuit & passing excess oxygen instead of hydrogen the instrument may be made to detect small quantities of hydrogen as impurity in gases. Means of re-calibrating this instrument when the activity of the catalyst decreases is also provided. The instrument is very sensitive but method of operating is too complicated. Impurities like sulphur and carbon from unsaturated hydrocarbons affect the catalyst efficiency.

4. Magnetic type oxygen recorder.

This type of analyser was developed by Dr. Lehrer of I. G. Farben Industries in 1942. The other types of oxygen recorders discussed in this article were found to give unreliable results with gases containing sulphur and unsaturated hydrocarbons. Oxygen posses a considerably higher susceptibility (about 100 times) than all other gases except nitric oxide and is highly paramagnetic while the other gases are diamagnetic. Direct measurement of susceptibility is very difficult as the forces involved are of very small magnitude.



Oxygen content of a gas mixture is determined by heating this mixture in a strong non-homogeneous magnetic field. The changes in the susceptibility of the gas with temperature and the magnetic field on the heated gas is different from that exerted by the field on the cold gas; thus a flow of gas is set up whose direction and strength is a measure of the oxygen content. Two hot platinum wires are placed in the non-homogeneous part of a magnetic field and connected in a bridge circuit to act as differential resistance thermometers. Molecules of hot gases are less strongly influenced by the Magnetic field than those of the cold gas and a continuous stream of gas flows in the direction of the arrow. A special feature of the instrument is that the platinum elements producing the necessary heat also act as the

measuring elements of the Bridge circuit. One fundamental disadvantage of this apparatus originally was the high degree to which the heat conductivity of the gas influenced the temperature and thus the sensitivity of the equipment. Oxygen content of gases containing various proportions of hydrogen could not be estimated by this method.

Dr. Lehrer has successfully solved these difficulties with his so-called "annular chamber." He used glass tubes between magnetic poles. Heating of the gas is done by a wire from outside the tube whose temperature is dependant only on the constant external heat lost and is unaffected by the heat conductivity of the gas in the measuring chamber. The magnetic field is in the order of 15000–17000 oersteds. Near the ends of the pole pieces the glass tube carrying the hot centre tapped platinum forms two arms of a wheatstone bridge. The deflection of the galvanometer is dependant on the cooling and heating of the gases and is proportional to the oxygen content of the gas. Disturbances due to air currents around the glass tube affect the instrument. To reduce this, the free space between the pole pieces within the annular chamber is packed with an insulating material.

The development of an oxygen recorder on the paramagnetic property of oxygen, has been a very difficult and expensive method. The exciting coil of the electro magnet has to be wound on a water cooled jacket and supplies heat to a thermostatic system which maintains the temperature of the annular chamber and pole pieces constant. A contact thermometer and "Vertex" relay valve operates the flow of water and temperature. The measuring system comprises of a glass tube and platinum windings. The current for the measuring bridge is supplied from a stabilising transformer. *Zero* point is adjusted by a potentiometer and the heating current by a sliding rheostat. The response is quick and recording takes place within 10 seconds. Routine servicing requires only checking of cold water and a mere zero-point test using a gas free from oxygen. The normal range of the instrument is 0–2% oxygen but extended ranges and "suppressed zero" ranges (15–20%) may be used. The I. G. claim that the zero point remains stable to within 1% of the full range over a period of months. The sensitivity stability is also good according to them.

Two of the famous instrument manufacturers have been able to manufacture magnetic type oxygen recorders using paramagnetic property of oxygen. But both these firms have not been able to make them available to all industries. The Cambridge Instrument Company, Great Britain and the Hays Corporation of America have already put a few of these instruments in the market but due to the limited number of instruments manufactured so far, it has not come to the service of all industries. The I. G. Farben Industries have also started producing a number of recorders on this principle.

മിശ്രവാതകങ്ങളിൽ നിന്നും ഓക്സിജൻ വാതകത്തെ പ്രത്യേകം കണ്ടുപിടിക്കാനും; അതിന്റെ പരിമാണം അളക്കുവാനും, രാസപരിശോധന നടത്തുവാനും മററും ഉപകാരപ്പെടുന്ന ചില നവീന യന്ത്രവിധങ്ങളേയും സമ്പ്രദായങ്ങളേയും പററിയുള്ളതാണ് ഈ ലേഖനം. ഫാക്ട് കമ്പനി ചീഫ് കെമിസ്റ്റ് ശ്രീ. എൻ. ഡി. ഗോപിനാഥ് ആണ് ലേഖകൻ.

UTILIZATION OF FRUITS AND VEGETABLES

By
Dr. G. S. SIDDAPPA.

MODERN researches have shown that fruits and vegetables are essential foods and contain highly protective factors such as vitamins and mineral which are indispensable for a proper diet. They are, however seasonal and are not, therefore, available in plenty, throughout the year. During short periods of glut they are available in plenty, but at other times, they are scarce and beyond the reach of the average consumer. During these glut periods large quantities of these valuable foodstuffs often go to waste for lack of proper storage and transport and also preservation facilities. This is almost a criminal waste of Nature's bounty and a very important source of food. All the world over the importance of the fruit and vegetable preservation industry in the agricultural economy of the country has been fully realised. The industry is eminently suited for small scale or large scale working. In several of the advanced countries of the world there are many large fruit and vegetable canning factories. In addition to these, during the peak of the fruit season countless homes will be busy with the preparation of canned and bottled fruits, jams, jellies and marmalades. These little efforts on the part of the citizens go a long way in conserving the nation's food resources. In India, however only a small beginning has been made so far and that too only recently. It is, therefore, of the greatest importance that vigorous efforts should be made to develop rapidly fruit and vegetable preservation in this Province.

The Province of Madras is rich in horticultural resources. It is famous for its mangoes, bananas, oranges and pineapples. We have also fairly large quantities of other important fruits, tropical as well temperate, such as papays, guavas, jack fruit etc. Very little effort has so far been made to preserve these on any large scale. The experiments conducted during the past six years at the Government Fruit Products Research Laboratory, Kodur, have shown that some of these important fruits can be preserved satistactorily in several ways. Some of the product like citrus squashes, mango and pineapple jams, candied fruit and peel etc., have been favourably received by the public. It is possible to work a small fruit preservation factory by a group of orchardists in different fruit growing localities as is being done in various other parts of the world, where fruit and vegetable preservation has come to stay as a stabilising force in the agricultural economy of the State.

By means of intensive propaganda and demonstration at their very doors and by providing all the necessary equipment at cheap rates fruit preservation can be made popular throughout the country. To achieve this a small beginning has

already been made by employing five trained lady fruit preservation demonstrators. They will demonstrate the preparation and preservation of simple products like fruit squashes, cordials, jams, jellies, marmalades, candied fruits, canned fruits, dried fruits and vegetables etc. in girls' schools and colleges, ladies clubs and institutes, public fairs and exhibitions. In course of time, the idea is likely to catch on and create public interest in this vital subject which is indispensible for maintaining a balanced diet and also to improve gradually the standards of living.

The task, being of a pioneer nature, is naturally an uphill one. The results may be slow, but will be definite. Enormous quantities of valuable food that might otherwise go to waste would be saved for the Nation by thousands of small homes all over the country. To prevent waste in any form is as important as making two blades of grass grow where only one grew before.

The work at the Fruit Products Research Laboratory is so planned that it should one day result in fruit and vegetable preservation becoming a home routine in countless homes all over the country. The other aspect of making it a large-scale industry has also been not lost sight of. No effort is being spared in speeding up this work although the obstacles to be overcome are quite formidable.

Although a number of varieties of mangoes are grown in the Province, only Baneshan and Neelum have so far been found suitable for canning. Fortunately, these are commercial varieties and are therefore, suitable for canning on a large scale. The juicy 'Rasam' varieties can be made into mango squash. Mango jam can be prepared from many of the varieties. Pineapples, guavas, grape-fruis, plums, etc., can also be canned. Jack fruit, musk-melon and palm kernel are also suited for canning.

Jams, jellies and marmalades can be prepared easily from many of our fruits. Fruit juices, squashes and cordials, which are delicious and healthy drinks, and are in great demand in any tropical country, can be prepared by simple methods. Little known fruits like woodapple, cashew apple, custard apple etc., have been transformed into excellent products. Home-drying and dehydration of fruits and vegetables by modern scientific methods is fairly simple. Luxury articles like candied and crystallised fruits, candied citrus peels etc. can be prepared at home. Thus there are several ways in which fruits and vegetables can be prepared and preserved. To popularise fruit preservation in the country, a number of steps have been taken. A short course of three months training in fruit canning and preservation has been started at the Government Fruit Products Research Laboratory, Kodur. A number of simple and helpful articles have been published regarding fruit preservation. Radio talks have been given. Fruit products are exhibited in different Exhibitions and actual demonstration of preservation ar-

ranged. Five lady-fruit preservation demonstrators have recently been employed to popularise fruit preservation in the Province. Simultaneously there is a vigilant inspection staff also to see that fruit products sold by manufactures to the public keep upto certain well-defined standards of quality. (It is felt that when the work is in full swing, the laboratory of quality.) It is felt that when the work is in full swing, the laboratory achievements will gradually become practical achievements also.

(Madras Agricultural Iournal)

നമ്മുടെ നാട്ടിൽ സുലഭമായ ചക്ക, മാങ്ങ, നേന്ത്രക്കായ, ആറഞ്ചു്, പിവത്തിച്ചക്ക, മുതലായ മധുരഫലങ്ങൾ പഴുത്തുകഴിഞ്ഞാൽ കുറെ ഉപയോഗിക്കയും ബാക്കി കേടുവരാതെ സൂക്ഷിക്കാൻ മാർഗ്ഗമില്ലാത്തതുകൊണ്ടു് ചീഞ്ഞു നഷ്ടപ്പെട്ടുപോകയുമാണ് ചെയ്യുന്നതു്. "പഴങ്ങളും കായ്കറികളും ഉപയോഗപ്പെടുത്തേണ്ട വിധം" എന്ന ഈ ലേഖനത്തിൽ, മദ്രാസ് കൃഷിഡിപ്പാർട്ടുമെൻറിലെ ഒരു ഉദ്യോഗസ്ഥനായ ഡാക്ടർ ജി. എസ്. സിദ്ധപ്പാ. മേൽവിവരിച്ച പഴങ്ങളെ കേടുകൂടാതെ സൂക്ഷിക്കേണ്ടതെങ്ങനെയെന്നും അവയിൽനിന്ന് ജാം, ജെല്ലി, മാർമലേഡു് മുതലായവ ഉണ്ടാക്കിയെടുക്കേണ്ടതു് എങ്ങനെയെന്നും വിവരിച്ചിരിക്കുന്നു.

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CORROSION

By
K. G. PHILIP, B. Sc.

IT has been estimated that, every year, corrosion destroys about 2% of iron and steel in use. In tropical climates it does the greatest havoc. The chemical industry has to meet this meanace in its most serious form. The extent of success in fighting this wasteful process is a determining factor in the economic planning of any chemical industry. In the same industry itself, conditions vary greatly, from place to place. Even small quantities of foreign matter may exert marked accelerating effect on rate of loss by corrosion. The permanent harm, that is done by allowing acidity, temperature, purity or other operating conditions to go beyond the safe range, due to carelessness, ignorance or desire to secure temporary increase in output, has often been insufficiently recognised. The gain in output thus secured is really a loss in as much as it leads to the avoidable wear and tear of equipments themselves in the process of production.

Though the trouble has been age-long the understanding of the nature of corrosive action is comparatively recent. Several speculations did exist, until Whitney and Evans demonstrated that corrosion is essentially electro-chemical in nature. According to this theory every element has an inherent tendency to go into solution in the adjoining medium. But as ions go into solution the metal piece gets a positive charge which has to be destroyed for the process to continue. This is fulfilled when one of the common types of galvanic concentration or oxidation reduction cells are formed.

Galvanic action is due to contact of a solution with metals having variable tendencies to go into solution, caused by want of homogeneity or uneven composition in alloys or presence of more than one different metal. Differences due to heat treatment or hammering causes the same metal to have different potentials, required for galvanic cell formation. Oxygen or oxidising agents play a predominant part in these cells by removing the hydrogen film that may be formed on the cathode. Dezincification, or eating up of one constituent of an alloy leaving the other in a free condition is a common case of galvanic action.

Concentration or solution cells have been found to be even more prevalent than galvanic cells. Differential aeration of the solution also causes formation of cells and these with the ones formed between the metal and cathodic films consume up the metal. Whenever insoluble products are formed out of the reaction it tends to be electrochemical in nature while in cases of soluble products being formed the reaction tends to be a case of direct chemical action.

Several factors exert contrary effects. Rapid movement of solu-

tion with respect to container reduces chances of concentration cells formation but at the same time the cathodic films that may be removed facilitates fresh action. In atmospheric corrosion the scales formed retain moisture or may form another electrode or the solution of the scale may form another corrosive matter, adding to the number present. Increase of temperatures accelerates corrosion rates as it does with other chemical reactions. Local differences in temperature, also create cells.

An examination of the surface by the naked eye or microscope will often reveal the type of corrosion that works on it. Loss in weight is not always a true index, as pitting may bring about breakdown sooner than direct chemical action as indicated by loss of weight. Pitting is the most destructive of all the forms. It is caused by the partial covering of the surface by the reaction products, lack of homogeniety, presence of inclusions or by exposure of metals to different strains, thermal or physical. One of the worst aspects about corrosion is its tendency to localize. Pits when once formed go on getting deeper due to difference in aeration outside and inside.

Rapid advance has been made after the nature of the reaction and the effects of the rate factors have been understood. Graphitic corrosion which is due to carbon, in cast iron and steel has been eliminated by improving methods of production to exclude free carbon. Production techniques of alloys have been so perfected as to get a truly homogeneous product. Cold working or improper heat treatment causes static stresses in the body of the alloy or metal. This or external strain creates inter granular phases and the solution penetrates along these boundaries and destroys the tenacity of the metal. Spontaneous disintegration results. So in metals or alloys made for corrosion resistance, cold working is scrupulously avoided and an effect of uneven heat treatment is got over by careful tempering.

Though alloys, the exact explanation of the high resistance of which is still unknown and is a matter on which fundamental research is going on, exist, to withstand any particular set of conditions, high costs prohibit their general use. As long as special alloys retain their high prices resort has to be made to such means as control of operating conditions, protective linings and paints, restricting use of alloys to parts meant for high temperatures or heavy friction.

Use of linings in tanks containers and such equipments has been highly successful and is being adopted wherever possible by all progressive manufacturers. For giving metallic coatings many processes exist, electroplating, sherardising, dipping in molten metals etc. But painting remains the universal means to protect metals from decay.

Extensive modern researches have brought out a variety of paints with widely different properties. Chlorinated rubber and plastic paints are in wide use and are very effective; they are even used instead of linings in certain cases. Apart from

forming protective covering, some of the pigments used in paints exert a strong inhibiting effect on corrosion reactions. Chromium compounds, Barium sulphate and basic pigments like red lead, white lead and zinc dust, all inhibit the reaction of rusting and form very good bases.

The durability of a paint coating mainly depends on there being no foreign matter between the paint and metal, the opaqueness of the paint, and air about the place. Paints applied without properly cleaning the surface is a waste, apart from the loss by corrosion which continues. Pickling in dilute acid is a very effective way of preparing the surface. But this is seldom practicable. Sand blasting or scraping is good enough if completely done. Moisture, if enclosed in paints, causes quick deterioration. Paints to be lasting should be applied in dry weather and in atleast three layers. Paints when properly applied last for about four years, after which renewal is necessary. There is no reason why iron and steel should not, if properly protected last indefinitely.

The causes and types of corrosion are so many, and only a few of them may be operating in particular conditions that a hard and fast prescription to combat it is impossible. However with an understanding of the mechanism of corrosion and the various factors involved, particular cases can be studied and measures taken to check this costly waste.

ഇരുമ്പു മുതലായ ലോഹങ്ങൾകൊണ്ടു നിർമ്മിക്കപ്പെടുന്ന ഉപകരണങ്ങൾ തുരുമ്പിച്ചുപോകുന്നതിനെപ്പററിയും, അങ്ങനെ തുരുമ്പെടുത്തു നശിച്ചുപോകാതിരിക്കാൻ, ചായമിടുക, മണ്ണുപയോഗിച്ചു മോറുക, പ്ലാസ്റ്റിക്കുകൊണ്ടു പൊതിയുക എന്നും മററുമുള്ള സംരക്ഷണവിധികൾ അനുഷ്ഠിക്കേണ്ട ആവശ്യകതയെപ്പററിയും വിവരിക്കുന്ന ഒരു ലേഖനമാണിതു്. ഫാക്ടു് കമ്പനിയിലെ ഒരു ഓപ്പറേറർ ആയ ശ്രീ. കെ. ജി. ഫിലിപ്പ് ബി. എസ്. സി. ആണു് ലേഖകൻ.

We look backward regretting, forward hoping, while the present stands offering us flowers.

–Goldsmith–

FACTS THAT INTEREST

Manufacture of pure Beryllium.

Pure Beryllium was isolated for the first time in 1947 in the laboratories of the Praz Factory in Maurienne. In view of the importance of this metal, production in the factory passed immediately from the laboratory to the work-shop stage, and at the present moment the daily out-put is several kilogrammes of beryllium as 99.9 per cent pure. The Calypso Factory, which is also in Maurienne, and was destroyed during the war, is now being rebuilt, and beryllium will be produced therein an industrial scale.

There is also a factory at St. Jean de Maurienne which manufactures beryllium-bronze, a binary alloy, whose mechanical properties are particularly interesting, its stability under an electric Arc is remarkable; its thermal conductivity is four times greater than that of steel and double that of phosphor bronze, its resistance to wear is seven times greater than that of phosphor bronze or aluminium bronze. Because of its resistance to oxidation and corrosion, its elasticity and its good conductivity, it is used for electrical apparatus, precision machinery and in the manufacture of tools likely to produce dangerous sparks on impact.

Industrial Treatment of Seaweed in Morocco.

A factory has just been equipped at Safi, a Moroccan Port on the Atlantic coast, for the treatment of Seaweed of which there are huge natural beds at the coast. An old landing barge has been specially converted for this purpose and fitted with a cutting device at the Stern. The device was invented by a French engineer. It is electrically operated and can cut sea weed down to a depth of 130 ft., but it usually works at a depth of 50 ft. in order not to risk uprooting the sea weed. When it is cut, the sea weed is collected in nets and piled up on the deck. The working capacity of the barge is 10 to 12 tons an hour, and it is has a crew of six. The seaweed is dried in the sun, ground and crushed mechanically, the iodides are then extracted by chemical treatment, as are the alginates which are being used to an increasing extent in a large number of industries.

Pakistan's Development Plan.

The establishment of plant for jute, paper, fertilisers, steel, rubber, tyres and tubes, heavy chemicals, heavy engineering and ship-building, involving capital of about 35 crores of rupees, is contemplated by the Government of Pakistan, according to Mr. Fachur Rahman, Minister for Commerce and Industries.

Representatives of the Power-Gas Corporation of the United Kingdom and the Chemical Construction Company of the United States are now in Pakistan in connection with a fertiliser project which the Government is sponsoring. Experts of the Belgian firm Union Chimique Belge are also to visit

Pakistan shortly to advise the Government.

The Pakistan Government provisionally is of the view that a factory with a capacity of 100,000 tons of ammonium sulphate should be established in West Punjab.

The Minister also states that an expert from the Bureau of Reclamation of the U. S. Department of the Interior will shortly make a survey of the Dominion's river basins to advise on the desirability of setting up regional authorities on the lines of the Tennessee Valley Authority.

Detector for Pipe Leaks.

A time-tested but not too well-known, device quickly locates leaks in pipes, tanks, or other storage vessels by application of a vacuum. In operation, the seams to be tested are covered with soap studs, an inspection box having a clear glass top and soft rubber base is laid over the seam, and a powerful vacuum created. This draws air through any leaks, causing soap bubbles to form which are clearly visible through the glass top. Testers are available in a wide variety of shapes and sizes for inside corners, outside corners, circumferential seams and straight seams.

New Meta Alkyl Phenols.

Cashew-nut-shell as a source of Varied Derivatives.

The main constituents of cashew-nut-shell liquid are phenolic in nature and contain a high proportion of monohydric meta-substituted phenol, a proprietary form of which is known as Cardanol and is used for making synthetic resins. A new development is the hydrogenation of the liquid to produce two meta-alkylphenols, the 3-pentadecyl phenol and 5-pentadecyl resorcinol. The former compound can be obtained in a yield of approximately 45 per cent of the cashew-nut-shell liquid, while the 5-pentadecyl resorcinol is produced 5 per cent.

Solvents and Special Resins.

Some of the uses for these products include conversion to oil additives, anti-oxidants for petroleum fuels, and mutual solvents for the rotenone-containing resins with petroleum hydro-carbons, these solutions being used for insecticidal purposes. Interesting new heat-reactive resins can be made by a one-stage process from these phenols.

The 3-pentadecyl phenol is a waxy solid, pale amber in colour. It has a melting point of 49°-51°C and a boiling range of 190°-195°C at 1 mm. mercury. This phenol is insoluble in water and aqueous alkalis but is very soluble in organic solvents, including aliphatic hydrocarbons.

The 3-pentadecyl phenol forms heat-reactive resins with an equimolecular amount of formaldehyde and using either acid or alkaline catalysts. These one-stage resins while in the fusible stage are readily soluble in hydrocarbons, including the aliphatic, such as naphtha or mineral spirits. They are being examined for use as coating resins.

Hydrogenated Cardanol sulphonates very easily when heated with concentrated sulphuric acid at 125°C. (preferably under vacuum).

When complete water solubility is reached, after about two hours, the hot mixture is poured into heptane, the solution heated for complete solution, and then cooled to cause crystallisation of the sulphuric acid which is recovered by filtration.

The sulphonated product is readily soluble in water and is soluble in all the organic solvents except the aliphatic hydrocarbons (cold). The sodium and potassium sulphonates are practically insoluble in water but are soluble in a wide range of solvents. These sulphonates are suggested as additives for dry-cleaning fluids.

Interesting nitro compounds are obtained from 3-pentadecyl phenol by treatment of a solution of hydrogenated Cardanol in chloroform with fuming nitric acid. Both 4-nitro and the 6-nitro 3-pentadecyl phenols are obtained, the first named having a melting point of 71·5°–72° C and the 6-nitro compound a m. p. of 43°-43° C. A tri-nitro derivative can be prepared by utilising the disulphonic acid. These three nitro compounds are soluble in practically all the common organic solvents, with the exception of cold alphatic hydro-carbons for the 4-nitro phenol and of the lower aliphatic alcohols for the 6-nitro compound.

The most important amino derivatives is the 4-amino-3-pentadecyl phenol made by reducing the nitro derivatives with hydrogen and Raney nickel catalyst in ethyl acetate solution. The pure 4-amino compound has a m. p. of 105.5°-106.5° C, while the pure 6-amino phenol has a m. p. of 133°-134°C.

The Irvington Varnish and Insulator Co. of New Jersey, U. S. A., reports that the 4-amino-3-pentadecyl phenol is likely to assume considerable importance as a gum inhibiter in petrol.

Wax Uses.

The lower alkyl ethers of 3-pentadecyl phenol are low melting solids, the higher alkyl ethers (up to octyl) are liquids, and the higher alkyl ethers, such as lauryl and stearyl, are solids of increasing melting point. An interesting waxy ether, un-affected by boiling alkalis, is prepared by combining 2 moles of anhydrous sodium salt of hydrogenated Cardanol with 1 mole of 1. 4-dichlorbutene.

This wax has a m. p. of 71°-73° C and is insoluble in the lower alcohols but soluble in hydrocarbons. It is possible that this waxy ether may be of interest for improving the alkali resistance of wax preparations for treating floors, polishing car bodies, and finishing leather.

The 5-pentadecyl resorcinol is a waxy solid having an iron or greyish white colour. Its molecular weight is 320, its melting point 91°-93° C, and its boiling range is 220°-225° C at 1 mm. mercury.

News & Notes

Ammonia as Fertiliser.

In a paper to the American Chemical Society at its general meeting in Atlantic City, N. U., W. B. Andrews and M. Geiger, of the Mississippi Agricultural Experiment Station, said that anhydrous ammonia was introduced to the farmers of Mississippi on March 7, 1947 and by June 30,90,000 acres had been fertilised with it. From July 1, 1947 to June 30, 1949, about 1,000,000 acres were so treated.

Anhydrous ammonia is also being used in considerable quantities in Arkansas and Louisiana, and to a smaller extent in Alabama, Missouri, Tennessee and Jexas, with a very small amount being used in Georgia and a few other states.

In general young plants prefer ammonium nitrogen, and older plants prefer nitrogen. The pH of the soil is one of the primary factors which determine the rate of nitrification. On soils, with a pH of 5 or less the rate of nitrification is slow, and anhydrous ammonia may be applied in October to Autumn—planted oats for grain, and the results obtained are equal to those for ammonium nitrate applied in March. On soils with a pH of 5.5 higher, the rate of nitrification is high and anhydrous ammonia applied in October is converted into nitrates and largely leached out of the soil before spring.

When applied to Autumn—planted oats in January, anhydrous ammonia is satisfactory on strongly acid soils.

New Type of Tyre Tread.

A new tread for motor tyres, incorporating coils of wire which wear down to form thousands of steel bristles protruding from the tyre, was shown to road transport authorities recently by Sir Patrick Hamilton, chairman of Tyresoles, Ltd., which is responsible for this development.

Greater Resistance to Wear and Skidding. The main advantage claimed for the new tread is that it reduces the risk of skidding on wet roads and bad surfaces. Tests carried out by the Road Research Laboratory of the Department of Scientific and Industrial Research have shown that on wet wood blocks the average retardation from 30 m. p. h. is improved by one-fifth with the new tread, which is called Wyresole.

An incidental, but important, advantage of the new tread is its resistance to cuts by stones, flints or glass.

Mildew in Books.

Outbreaks of mildew, damaging to bookbinding materials or books in store, have been experienced by many bookbinders and publishers visited by staff of the Printing, Packing and Allied Trades Research Association, and there is evidence that British bound books do not, in general, resist these attacks or damage by insects as well as do

books bound in the U. S. A. Consequently, at the request of its bookbinder members and the Publishers' Association, Patra has now published a bulletin * explaining what causes mildew on books and how it can be prevented.

Causation and Prevention. "Mildew" is caused by moulds, whose tiny spores ("seeds") are readily airborne even by a normal room atmosphere. Given a moist and warm atmosphere these spores quickly become moulds, deriving their food from the material on which they form, and during their growth they may produce carbonic, citric, gluconic, fumaric, oxalic, or other organic acids which can damage or ruin the materials on which they grow.

Printing papers, end papers, dust covers, chipboard, millboard, strawboard, mull or calico, sewing thread, many of the finishes of bookcloths, leather, most adhesives—nearly all the materials used in the production of bound books—are fertile ground for the growth of these damaging moulds.

This Patra Bulletin describes clearly and simply how mould infection can be kept to a minimum. The main thing is to maintain cleanliness in all operations and all departments, to do away with damp spots, to keep the air as dry as possible, and the temperature down to or below 65° F. By keeping the air in the workshop constantly on the move, by open windows and or proper types of electric fans, the mould spores are given no chance to settle, and any moisture on the surfaces of stored materials will be quickly evaporated. As much sunlight as possible should be let in.

Precautions with Adhesives.

Adhesives provide fertile culture media, so all pots, utensils, machines and brushes must be kept strictly clean, and empty drums, racks, etc., which have contained or been used with adhesives should be destroyed or returned to the makers.

Stacks of paper and boards should be kept away from outer walls and raised off the ground, and the air in the store kept reasonably dry, cool and on the move. Corrugated paper and brown wrappings should be kept away from the main stores.

Bookcloths, tapers and thread should be kept in dust-free stores, at a temperature between 45° and 65° F. Bound books should be given time to dry before they are packed for despatch.

To clean bound books slightly damaged by mildew a clean linen pad carrying some cedarwood or clove oil, or saddle soap for leather bindings, are among Mr. Armitage's recommendations. Any such remedy should be tried out on a small section of the affected book first, and care should be taken to prevent mould spores from damaged books coming off them (as by brushing) and settling on uninfected books.

Search for New Inhibitors As regards the prevention of mould

* "The Cause of Mildew on Books and Methods of Prevention," by F. D. Armitage.

damage to bookbinding materials, it is pointed out that no one substance yet known will prevent mould from growing on books. Each material used must be treated with its own type of inhibitor, but the result of work now going on should be to enable the manufacturers of book-making, book-binding materials to supply, in the future, fully inhibited materials.

Moulds do not readily grow on the newer synthetically filled book-cloths, or on synthetic emulsion adhesives. In U. S., advantage is taken of best quality boards, nylon for sewing, and synthetic adhesives, but cost is still a factor to be considered here.

Twin chicks hatched.

While handling eggs from an incubator, an Australian poultry farmer was surprised to see one chipped on both sides.

He handled it carefully and gave the chicks a little help to break the shell.

Now he has twin Chinese Langshan chickens. They are abnormally small and are being mothered by a hen.

These twin chickens came from a brown-shelled egg weighing $2\frac{3}{4}$ ounces. Chick sexers say that double-yolked eggs usually weigh about four ounces but it is rarely that both yolks are fertile.

Hard Stainless Steel.

Claims for New U. S. Proces.

By a combination of extreme heat treatment and the deep-freeze principle an American company, the Robeson Cutlery Company, Perry, New York, claims to have overcome the comparative softness of stainless steel of the type used for cutlery and similar purposes. Knives made by the process are claimed to hold their keenness for three years and to be more resistant than conventional carbon steel.

Discussing the process, for which patent application has been made, Mr. Emerson E. Case, president of the company and originator of the method, states that tests and analyses so far indicate practically no difference in the composition or chemical characteristics of steel produced by the process and steel hardened by conventional methods. Tested on a standard Rockwell hardness testing machine, the new steel may show a hardness substantially the same as steel made by other process.

Knife blades are first heated to a temperature much higher than that normally employed for this process. The blades are then bathed in quenching oil, according to the usual process, at a temperature of 104° F. Then they are placed in a specially-constructed deep freeze chamber at sub-zero temperatures.

After a suitable period of freezing, they are again heated, to relieve the usual stresses and strains. The blades are allowed to cool gradually to room temperature. Finally, they are tempered in the conventional manner to the desired degree of hardness.

Plastic Piping.

Large-scale production of plastic piping for various industrial uses, is being carried out in Melbourne. Uses are for carrying distilled water, for beer out of barrels in hotels, and for fruit juices in cordial factories. It is under test for future use for both gas and water.

Plastic piping is six times lighter than metal and its installation cost is in line with that of metal pipe. An unusual application is its use for piping corbon dioxide, well known as a punishing material where metal pipes are concerned. This cellulose acetate butyrate pipe has big industrial possibilities.

Method of joining the lengths is by plastic sleeves, affixed with a special cement, which is plentiful locally. Special connectors have also been devoloped for joining this plastic piping to metal.

International Superphosphate Manufacturers' Association.

On the invitation of the Montecatini concern, a series of Technical Meetings of chemists and technical experts was held in Milan and Assisi between the 25th and 28th October, 1949.

Some hundred delegates from no less than seventeen different countries in Europe, Africa, Asia and Australasia attended. F. A. C. T. was represented by Mr. S. Nallaperumal, Superintendent in charge of Superphosphate manufacture in the factory.

While in Milan, a number of papers under three headings, namely: Sulphuric Acid, Phosphoric Acid and Triple Superphosphate and ordinary Superphosphate were presented and discussed.

Delegates then proceeded to Assisi in order to visit the completely reconstructed Superphosphate plant there which employs the Montecatini process for continuous production of Superphosphate, and on the way from Milan to Assisi, a visit was also paid to the Sulphuric works at Reggio Emilia.

Consideradle hospitality was shown to delegates by the Montecatini concern, who made all the arrangements for the meetings.

It is planned that the next series of Technical Meetings of the Association will take place in France in late September or early October, 1951, by invitation of the French Superphosphate producers.

The state of life is most happy where superfluities are not required and necessaries are not wanting.

— Plutarch.

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November News

Distinguished Visitors.

I. Messrs. Edward Shim of the ECAFE, Bankok and Ignatiff of the F. A. O. both, branches of the United Nations Organisation visited the factory on the first of this month.

"I am very much impressed with the efficiency of the fertiliser plants of this company" writes Mr. Shim, and "Diligence, vision and ambition appear to be the Keynotes of this industry" remarks Mr. Ignatiff in the 'FACT' Visitors' Diary.

II. The Hon. Mr. N. Kunjuraman, Minister for Industries, U. S. T. C. accompanied by personal staff visited the factory on the 12th of this month. He was taken round by the Management to the various plants of the factory. The details connected with the working of each plant were explained to him by the Superintendents-in-charge of the respective plants.

The Minister evinced keen interest in the working of the factory and asked many questions concerning the manipulation of the plants out-turn, raw materials and other relevent problems in the day today working of the factory, and eventually recorded his impressions in our Visitors' Book as follows:--

> "I visited the factory today. I am really impressed with its working and to me it appears very good so far as it goes to produce the manures. A variety of by-products that come into being as a result of different operations still remain to be exploited to commercial advantage. I wish the Instituti n greater success and utility in the fulness of time."

After a stay of over two hours the Minister and staff left at about 12-20 P. M.

A photograph taken on the occasion is reproduced on the front cover page of this issue. In it are seen from left to right, Sri. P. Sreedharan Pillai, The Hon. Sri. N. Kunjuraman, Sri. P. K. Seshan, Sri. T. V. Doraiswamy and Sri. K. A. Varugis.

Sports:

A triangular tournament for games as well as athletics was conducted this year under the auspices of the Royal Indian Navy, F. A. C. T., and the U. C. College, Alwaye. The Union Christian College, Alwaye won the trophies for games as well as sports rather comfortably this year. F. A. C. T., the winner of last year's trophy for games tied with the Royal Indian Navy this year with 10 points.

This year's tournament forcefully revealed some of our weak nesses, as well as our strength. The fact is that we have got only a limited number of really class sportsmen, and some of them are getting past their prime; but no fresh reinforcements are forthcoming to replace the old stalwarts. Our main strength lies however in our cheery optimistic spirit.

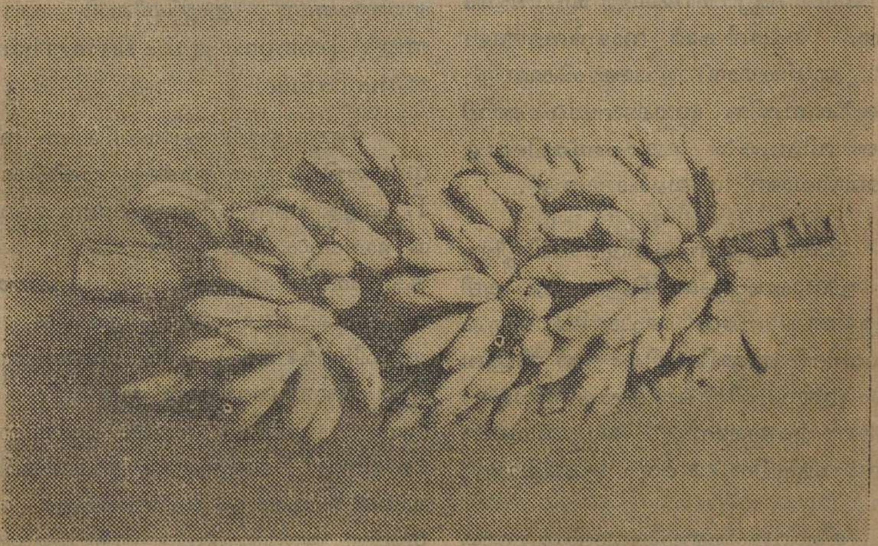
As regards the games proper, in football we were overwhelmed by the R. I. N. although we managed to draw with the U. C. College, while in hockey we beat the R. I. N. but in turn were beaten by the U. C. College to the tune of 1 goal to their 7. In cricket also we were most surprisingly beaten by the U. C. College, but the match with the R. I. N. ended in tie thanks to some inspired bowling in the closing half hour by Messrs. Raghavan and Ranganathan. In volley ball we put up a really good show winning a fine match in the R. I. N. although beaten, by the U. C. College. On our side Gopalan played magnificently.

Basket-ball is the one game where we showed striking improvement. We beat the R. I. N. and the U. C. College had to put forth their very best effort to win against us. Messrs. Satyanesan and K. M. Verghese were really outstanding, in this game.

Marriage:

The marriage of Sri. K. A. Nagendra Nayak of the Central Accounts F. A. C. T. with Sow. Manorama Bai, grand-daughter of Sri. N. Venkateswara Shenoy of Cochin was celebrated at the bride's residence, Edavazhikkal, Varapuzha on the 30th of this month, forenoon. There was also a grand garden-party in the evening at which many members of the Factory took part with good relish.

We offer the newly wedded couple our cordial felicitations.



Plantain bunch of the POOVAN variety produced at the Fact Experimental Garden by the copious use of Superphosphate.

മിശ്രവളം

കണ്ണിൽ കണ്ടതും കയ്യിൽ കിട്ടിയതും ചേർത്ത്

കമ്പോസ്റ്റ് വളം നിർമ്മിക്കുന്ന രീതികൾ.

1945-ലെ സ്ഥിതിവിവരണക്കണക്കുകളിൽനിന്ന് ജപ്പാനിൽ 148 ലക്ഷം ഏക്കർ കൃഷിചെയ്യുന്ന ഭൂമിയുണ്ടെന്നും അത്രയും സ്ഥലത്ത് 770 ലക്ഷം ടൺ മിശ്രവളം ഉണ്ടാക്കുന്നുണ്ടെന്നും കാണുന്നു. അതേകാലത്ത് ഇൻഡ്യയിൽ 2000 ലക്ഷത്തോളം ഏക്കർ സ്ഥലം കൃഷിചെയ്യുന്നുണ്ടെന്നും അവിടെനിന്നും കിട്ടുന്ന മിശ്രവളം 2000 ലക്ഷം ടൺ മാത്രമാണെന്നും കാണുന്നു. എന്നുതന്നെയുമല്ല, ജപ്പാൻകാരുണ്ടാക്കുന്ന വളത്തിൽ രണ്ടു ശതമാനം പാക്യജനകമുള്ളപ്പോൾ ഇൻഡ്യയിലുണ്ടാക്കുന്നതിൽ ഒന്നര മുതൽ ഒന്നേമുക്കാൽ ശതമാനം വരെ പാക്യജനകം മാത്രമാണുള്ളത്. ഇത്രയും പാക്യജനകം നീരുവലിഞ്ഞ (on dry basis) നിലയിലാണുള്ളത്.

ജപ്പാൻകാർ ഉപയോഗിക്കുന്ന വളത്തിൽ സർവ്വപ്രധാനമായത് മിശ്രവളമാകുന്നു. ജപ്പാൻകാർ നാടൻവളങ്ങളാണ് അധികമായി ഉപയോഗിക്കുന്നത്. ഏക്കർകണക്കിനു നോക്കുമ്പോൾ അവിടത്തെ വിളവുകൾ ലോകരംഗത്തിലെ മുന്നണിയിലാണ് നിലകൊള്ളുന്നത്.

കൃഷിചെയ്യുന്ന ഭൂമിയുടെ വിസ്തീർണ്ണവും ഉണ്ടാക്കപ്പെടുന്ന മിശ്രവളവും കൂടി ഒത്തുനോക്കുമ്പോൾ ജപ്പാനിൽ ഏക്കറൊന്നിന് അഞ്ചിലധികം ടൺ മിശ്രവളവും ഇൻഡ്യയിൽ ഒരു ടൺ മിശ്രവളവും ആകുന്നു ഉണ്ടാക്കുന്നത്. ജപ്പാനിലുണ്ടാക്കുന്ന വളത്തിനു മേന്മയും കൂടുതലാണ്.

മിശ്രവളം ഉണ്ടാക്കുവാൻ വെറുതേ കളയുന്ന പല സാധനങ്ങളും ഉപയോഗിക്കാം. തിരുവിതാംകൂർ കൃഷിഡയറക്ടരായിരുന്ന മി. കുഞ്ഞൻപിള്ള പറഞ്ഞിരിക്കുന്നത് "കണ്ണിൽ കണ്ടതും കയ്യിൽ കിട്ടിയതും കാലിൽ തടഞ്ഞതും എല്ലാം ചേർക്കാം" എന്നാണ്. കൃഷിസ്ഥലത്തെ കളകളും വിളവുകളുടെ അവശിഷ്ടങ്ങളും തൂപ്പുകളും കുളപ്പായലും പുര മേയുമ്പോൾ കിട്ടുന്ന ഓലത്തുരുമ്പുകളും അറക്കപ്പൊടിയും ചകിരിച്ചോറും പഴയ പായ്, ചാക്ക്, തുണി മുതലായവയും എച്ചിലില കറിക്കു നുറുക്കിയതിൽ ബാക്കി തള്ളുന്നത് എന്നുവേണ്ട, നാം വെറുതേ കളയുന്നതെല്ലാം മിശ്രവളം ഉണ്ടാക്കേണ്ടതിലേക്ക് ഉപയോഗിക്കാം. "പലതുള്ളി പെരുവെള്ളം" എന്നു പറഞ്ഞതുപോലെ പല സാധനങ്ങളും പലപ്പോഴായി വളക്കുഴിയിലിട്ടാൽ അവസാനം ടൺകണക്കിന് മിശ്രവളമാണു കിട്ടുന്നത്. അതുകൊണ്ടാണ് മിശ്രവളം കൃഷകന്റെ സേവിങ്ങ്സ് ബാങ്കാണെന്ന് ഇംഗ്ലീഷ്കാർ പറയുന്നത്. (compost is the savings bank of the farmer)

മിശ്രവളത്തിനുപയോഗിക്കുന്ന സാധനങ്ങളിൽ മൂന്നു തരങ്ങളുണ്ടായിരിക്കും. 1. എളുപ്പത്തിൽ ചീഞ്ഞുചേരുന്ന മൃദുവായ ഭാഗങ്ങൾ. 2. നാരു കോച്ച. 3. കട്ടപ്പമേറിയ ഭാഗങ്ങൾ. ഉദാഹരണമായി ഒരു വെണ്ടച്ചെടിയുടെ ഇലകൾ വേഗം ചീഞ്ഞുചേരും; പിന്നെ നാരും കോച്ചയും. അവസാനമാണ് അതിന്റെ മരം (woody portion) നുറുങ്ങി പൊടിഞ്ഞുചേരുന്നത്. അതുകൊണ്ടു് മാർദ്ദവമേറിയ ഭാഗങ്ങൾ ധാരാളം ചേർന്നാൽ വളം വേഗത്തിൽ അളിഞ്ഞുചേരുവാൻ എളുപ്പമാണ്. മിശ്രവളം ഉണ്ടാക്കുവാൻ ഉപ

യോഗിക്കുന്ന സാധനങ്ങൾ ചെറുതുണ്ടുകളായി കൊത്തിനുറുക്കിയിടുന്നതു് വേഗം പാകപ്പെട്ടു കിട്ടുവാൻ നല്ലതാകുന്നു. ഉദാഹരണമായി, കുലവെട്ടിയ ഒരു വാഴ അങ്ങനെതന്നെ ഇടുന്നതിനേക്കാൾ വെട്ടിയരിഞ്ഞിടുന്നതാണ് നല്ലതു്.

മിശ്രവളം ഉണ്ടാക്കുന്നതു പ്രധാനമായി രണ്ടു തരത്തിലാണ്. 1. ഇൻഡോർ രീതി (Indore method) 2. ഫൌളർ സമ്പ്രദായം (Fowler method). ഒന്നാമത്തേതാണ് എളുപ്പമായ രീതി. പക്ഷെ, വളം വേഗത്തിൽ പാകപ്പെട്ടുകിട്ടുവാൻ രണ്ടാമത്തേതാണ് നല്ലതു്.

ഇൻഡോർ രീതി

ഇതിൻെറ പേരിൽനിന്നുതന്നെ, പരീക്ഷണം നടത്തിയ സ്ഥലം മനസ്സിലാക്കാം. സൗകര്യമായ ദീർഘവിസ്താരവും രണ്ടടി ആഴവുമുള്ള കുഴികൾ വേണം. കുഴിയിൽ ഒന്നാമതായി ഒരു നിര (സുമാർ മൂന്നിഞ്ചു ഘനം) ചവറു നിരത്തുക. മീതെ ചാരമോ മൂത്രം നനഞ്ഞ മണ്ണോ വിതറുക. അതിനുമീതെ ഒരു നിര ചാണകം (രണ്ടിഞ്ചു ഘനം) നിരത്തണം. പിന്നെ സാവധാനത്തിൽ വെള്ളംതളിച്ചു നനയ്ക്കണം. ഇങ്ങനെ അട്ടക്കട്ടക്കായി കുഴി നിറയ്ക്കേണ്ടതാണ്. ഓരോ അട്ടക്കും വെള്ളം തളിച്ചു നനയ്ക്കണം. അവസാനം മൂത്രം നനഞ്ഞ പട്ടക്കയും (കന്നുകാലികൾക്കു് കിടക്കുവാൻ വിരിച്ചുകൊടുക്കുന്ന വൈക്കോൽ ചണ്ടു് മുതലായവ) ചാണകവും നിരത്തി ഒരു നിര മണ്ണുകൊണ്ടു മൂടിയിടണം. നനയ്ക്കുമ്പോൾ വെള്ളം ഒന്നായി ഒഴിക്കരുതു്. രണ്ടുമൂന്നു പ്രാവശ്യമായി സാവധാനത്തിൽ തളിച്ചു നനയ്ക്കണം. ആദ്യത്തെ മൂന്നു ദിവസം വളക്കൂട്ടു് രണ്ടു നേരവും നനയ്ക്കണം. പിന്നെ മാസത്തിൽ രണ്ടുമൂന്നു തവണ നനച്ചാൽ മതിയാകും.

പാകംപോലെ ഈർപ്പവും വായുസഞ്ചാരവുമുണ്ടെങ്കിൽ വളക്കൂട്ടു് വേഗത്തിൽ അളിഞ്ഞുചേന്നു് പാകംവരും. വളം പാകപ്പെടുത്തിയതിൻെറ ലക്ഷ്യം ചൂടുപൊന്തലാണ്. വളക്കൂട്ടിൽ ഒരു കുടക്കമ്പി താഴ്ത്തിയാൽ ചൂടു പിടിക്കും. കുതിര ച്ചാണകം ഉപയോഗിച്ചാൽ ശക്തിയായ ചൂടുണ്ടാകും. അതിൽ ഒരു കിഴങ്ങിട്ടാൽ വെന്തുപോകും. രാവിലെ നോക്കിയാൽ കുതിരലായത്തിൽനിന്നും പുക പൊന്തുന്നതു കാണാം. മിശ്രവളമുണ്ടാക്കുമ്പോൾ ചാണകത്തിൻെറ സ്ഥാനത്തു് കുതിരലത്തിയോ, ആട്ടു്, കോഴി, താറാവു് ഇവയുടെ കാഷ്ടമോ ചേക്കാം. മൂത്രം കൂടക്കൂടെ തളിച്ചാൽ വളത്തിനു വീര്യം കൂടുന്നതാണ്.

കൂട്ടം നനവും ശരിയാണെങ്കിൽ വളക്കൂട്ടു് വേഗത്തിൽ നിറം മാറിത്തുടങ്ങും. ഒരു മാസംകൊണ്ടു് കറുത്തിരുണ്ടു പൊടിഞ്ഞുതുടങ്ങും. 15 ദിവസം കൂടുമ്പോൾ വളം കിളച്ചു മറിച്ചു് വീണ്ടും കൂട്ടിയിട്ടു് തളിച്ചു നനയ്ക്കണം. ഇങ്ങനെ ചെയ്യുന്നതു് വളത്തിൻെറ എല്ലാ ഭാഗവും ഒരുപോലെ വായുവും നനവും തട്ടി പാകപ്പെടുവാൻ വേണ്ടിയാകുന്നു. ഇങ്ങനെ രണ്ടു മാസം കഴിഞ്ഞാൽ വളം കുന്നുകൂട്ടിയിടണം. അടിവശംകൊണ്ടു് പത്തടിയും മേൽവശംകൊണ്ടു് ഒൻപതടിയും വിസ്താരം വേണം. മൂന്നടി പൊക്കമാകാം. ഇത്തരം കൂമ്പാരങ്ങളായി കൂട്ടി വെള്ളം തളിച്ചു നനയ്ക്കുക. മാസത്തിൽ രണ്ടു മൂന്നു തവണ ഇങ്ങനെ ചെയ്താൽ വളം പൂർണ്ണമായി പാകപ്പെട്ടു് ഉപയോഗിക്കത്തക്ക നിലയിലാകും.

ഫൌളർ സമ്പ്രദായം

ഈ പദ്ധതി ഡോക്ടർ ഫൌളർ എന്നൊരാളാണ് കണ്ടുപിടിച്ചു് നടപ്പിലാക്കിയതു്. ഇതിനു സമയം കുറവും കൂലിച്ചിലവു് കൂടുതലായുമിരിക്കുമെന്നു് മുമ്പു പറഞ്ഞുവല്ലോ. വളം (ചപ്പു ചവറു്) ആറടി വിസ്താരവും രണ്ടടി ഉയരവുമുള്ള കൂമ്പാരങ്ങളായി കൂട്ടി മൂത്രമൊ ചാണകവെള്ളമൊ കൊണ്ടു നനയ്ക്കണം. കൊഴുത്ത ചാണകവെള്ളംകൊണ്ടു നനയ്ക്കുന്നതു്

അധികം നനായിരിക്കും. വളം ദിവസേന മറിച്ചിളക്കി നനയ്ക്കണം. ഇപ്രകാരം ചെയ്താൽ വളം രണ്ടു മാസംകൊണ്ടു് നല്ലവണ്ണം അളിഞ്ഞു പാകപ്പെട്ടു് ചാണകംപോലെയാകും. ജയിലുകൾ, മുനിസിപ്പാലിററികൾ ഇവിടെയെല്ലാം ഈ പദ്ധതി നടപ്പിൽ വരുത്തണം. ജയിലുകളിൽ ധാരാളം മനുഷ്യമൂത്രവും ചപ്പുചവറുകളും വേലയ്ക്കു് ആളുമുള്ളതിനാൽ അവിടെ ഈ പദ്ധതി സാദ്ധ്യമാണു്. അതുപോലെതന്നെ ധാരാളം ചപ്പുചവറുകളും തോട്ടിവേലക്കാരും ഉള്ള നിലയ്ക്കു് മുനിസിപ്പാലിററികൾക്കും ഇതു സാദ്ധ്യമാണു്.

മിശ്രവളനിർമ്മാണം ശരിയായി തുടങ്ങുനാപക്ഷം വളത്തിനുള്ള ആവശ്യത്തിൻെറ ഒരു പ്രധാനഭാഗം നിറവേററാം. മലയാളക്കരയിൽ തെങ്ങും വാഴയും പ്രധാനമാണു്. ഓണക്കാലത്തു് എത്ര നേന്ത്രക്കായാണു് ഓരോ സ്ഥലത്തും വെട്ടുന്നതു്. പലേടത്തും വാഴപ്പിണ്ടിയും വാഴക്കച്ചിലും വെറുതേ കളയുന്നു. വാഴപ്പിണ്ടിയിൽ പൊട്ടാഷു്, ഭാവഹം ഇവ ഗണ്യമായ തോതിലുണ്ടെന്നു് കണ്ടുപിടിച്ചിരിക്കുന്നു. ആ നിലയ്ക്കു് വെട്ടുന്ന വാഴയും കച്ചിലുമെല്ലാം കൊത്തിയരിഞ്ഞു്, മൂത്രവും ഉപയോഗിച്ചു് മിശ്രവളമുണ്ടാക്കി തെങ്ങിനുപയോഗിക്കുനാപക്ഷം വളം വാങ്ങിയിടേണ്ട പണച്ചെലവും ബുദ്ധിമുട്ടും വളരെ കുറയ്ക്കാം. ഇങ്ങനെ തെങ്ങുകൾക്കു വേണ്ട വളാംശങ്ങൾ കൊടുക്കുന്നതിനുപുറമേ, മിശ്രവളം മണ്ണിൻെറ ബാഹ്യപ്രകൃതി നന്നാക്കുകയും ജലഗ്രഹണശക്തി വർദ്ധിപ്പിക്കുകയും മണ്ണിനാനുകൂലമായ അണുപ്രാണികളുടെ പ്രവർത്തനത്തെ സഹായിക്കുകയും ചെയ്യും. മണ്ണിൻെറ ബാഹ്യപ്രകൃതി നന്നാക്കുന്നതു് വളാംശങ്ങൾ പ്രദാനം ചെയ്യുന്നതുപോലെതന്നെ വളരെ പ്രാധാന്യമേറിയ ഒന്നാകുന്നു. തെങ്ങൊന്നിനു് വർഷംപ്രതി 3-4 കൊട്ട മിശ്രവളം ഇട്ടുകൊടുത്താൽ അതിൻെറ ഗുണം പ്രത്യേകം കാണാം. രണ്ടുമൂന്നു കൊല്ലംകൊണ്ടു് തല കവർത്തിരുണ്ടു് കായ്ഫലം നിറഞ്ഞുകാണാം.

ക്ഷാരം (പൊട്ടാഷ്) തെങ്ങിനു് അത്യാവശ്യം വേണ്ട ഒരു വളാംശമാകുന്നു. പാക്യജനകവും ക്ഷാരവും അടങ്ങിയ വളങ്ങൾ ഇട്ടുനോക്കിയതിൽ തെങ്ങിനു വളരെയധികം ഗുണം കാണുകയുണ്ടായി. മൂത്രത്തിൽ ധാരാളം പാക്യജനകവും വാഴനാരിൽ ക്ഷാരവും ഉള്ള സ്ഥിതിക്കു് ഇവ രണ്ടും കുറേശ്ശെ ചാരവും കൂട്ടിച്ചേർത്തുണ്ടാക്കിയ മിശ്രവളം തെങ്ങിനു വളരെ നല്ലതാണു്. അതുകൊണ്ടു് കേരളീയർ വാഴത്തടിയും മൂത്രവും ഇപ്പോൾ ചെയ്തുവരുന്നതുപോലെ ഉപയോഗശൂന്യമായി കളയാതെ മിശ്രവളമുണ്ടാക്കി അവരുടെ സർവ്വസമ്പത്തായ തെങ്ങിനു കൊടുക്കണം. ഇക്കാര്യത്തിൽ സ്കൂളുകൾ, ആഫീസുകൾ, മുനിസിപ്പാലിററികൾ മുതലായ സ്ഥാപനങ്ങൾ ഒത്തൊരുമിച്ചു പ്രവർത്തിച്ചു് മൂത്രവും ചപ്പുചവറുകളും വെറുതെ കളയാതെ ഉപയോഗപ്പെടുത്തണം. മഴക്കാലത്തു് മിശ്രവളം ഷെഡ്ഡുകളിൽവച്ചു മാത്രമേ നിർമ്മിക്കാവൂ. (ഇൻഡ്യൻ കേന്ദ്ര നാളികേരക്കമ്മിററി ബുള്ളററിൻ)

കാർഷികസ്ഥിതി പരിഷ്കരിക്കാൻ

കുമരപ്പ കമ്മിററിയുടെ നിർദ്ദേശങ്ങൾ.

"കൃഷിഭൂമി കൃഷിക്കാരനുള്ളതാകുന്നു; കൃഷിക്കാരനും ഗവണ്മെണ്ടും തമ്മിലുള്ള ബന്ധത്തിൽ മദ്ധ്യവർത്തിക്ക് സ്ഥാനമില്ല" എന്ന് കോൺഗ്രസ് നിയമിച്ച കാർഷിക കമ്മിററി റിപ്പോർട്ടു ചെയ്തിരിക്കുന്നു.

കൂട്ടുകൃഷി വ്യവസ്ഥകൾ, കാർഷികോല്പാദനം വർദ്ധിപ്പിക്കാനുള്ള വഴികൾ, ചെറിയ ഖണ്ഡങ്ങളായുള്ള ഭൂസ്വത്തുക്കളുടെ നില, സ്വന്തം ഭൂമിയില്ലാത്ത കൃഷിക്കാരുടെ നില എന്നിവയെ സംബന്ധിച്ച് ആലോചിക്കാനും കമ്മിററിയോടാവശ്യപ്പെട്ടിരുന്നു. ജെ. സി. കുമരപ്പയായിരുന്നു കമ്മിററിയുടെ പ്രസിഡണ്ട്.

തുടർച്ചയായി 6 കൊല്ലത്തോളം കൃഷി നടത്തിവന്നവർക്കെല്ലാംതന്നെ തികച്ചും ഭൂമിയുടമസ്ഥത ലഭിക്കേണ്ടതാണെന്ന് കമ്മിററി അതിന്റെ റിപ്പോർട്ടിൽ ശുപാർശ ചെയ്തിരിക്കുന്നു. സ്വന്തമായിത്തന്നെ നേരിട്ടു കൃഷി നടത്തുന്നവരായ ഭൂമിയുടമസ്ഥന്മാരുടെ ഉടമാവകാശം മാത്രമേ വകവച്ചു കൊടുത്തുകൂടു. സ്വന്തമായുള്ള ഈ കൃഷിത്തൊഴിലിനെ സ്വയംപര്യാപ്തമാക്കുവാൻ ആവശ്യമായെടത്തോളം ഭൂമികൾ മാത്രം സ്വന്തമായി വെയ്ക്കാൻ ഭൂമിയുടമസ്ഥന് അനുവാദം നൽകാവുന്നതാകുന്നു. ന്യായമായ ഒരു വിലയ്ക്ക് ഭൂമി വിലയ്ക്കുവാങ്ങാൻ കഴിയുന്ന അവകാശമുണ്ടായിരിക്കണം. ഓരോ സ്ഥലത്തേയും ഭൂമിവില നിശ്ചയിക്കുന്നതിനുവേണ്ടി ഒരു കോടതിയെ നിയമിക്കുകയും ഈ കോടതി നിശ്ചയിക്കുന്ന വില സ്വീകരിക്കപ്പെടുകയുംവേണം. എല്ലാ തരത്തിലുള്ള കുടിയൊഴിപ്പിക്കലിനേയും ഉടൻ നിരോധിക്കണം; ഓരോ സ്ഥലത്തേയും ഭൂമിയുടമസ്ഥന്മാരുടെ ഉടമാവകാശത്തെ സംബന്ധിക്കുന്ന റിക്കാർഡുകൾ തയ്യാറാക്കാനായി കുറെ കോടതികളെ നിയമിക്കണം. അതാതു സ്ഥലത്തെ പൊതുജനാഭിപ്രായമറിയാനായി ഓരോ സ്ഥലത്തുനിന്നും ചിലരെ ഈ കോടതികളിൽ നിയമിക്കാവുന്നതാകുന്നു—ഇതൊക്കെയാണ് കമ്മിററിയുടെ മററു ശുപാർശകൾ.

ഇന്ത്യയിൽ നാനാഭാഗങ്ങളിലും വ്യത്യസ്തസ്ഥിതികൾ നിലവിലുള്ളതുകൊണ്ട് പൊതുവേ ഒരേ ഒരു വ്യവസ്ഥ നടപ്പിൽ വരുത്തുന്നതു ശരിയായിരിക്കുന്നതല്ല. (1 കൃഷിക്കാരന് വളർന്നുവരാൻ സൗകര്യമുണ്ടായിരിക്കണം (2) ഒരു ജനവിഭാഗം മററൊരു ജനവിഭാഗത്തെ ചൂഷണംചെയ്യുന്നതിന് സൗകര്യമുണ്ടായിരിക്കരുത്. (3) ഉല്പാദനത്തെ അങ്ങെഅററത്തോളം വർദ്ധിപ്പിക്കണം. (4) കാർഷികസ്ഥിതിയിൽ വരുത്തുന്ന പരിഷ്കാരങ്ങൾ ഉടൻ നടപ്പിൽ വരുത്താൻ സാധിക്കുന്നവയായിരിക്കണം. ഈ നാലു സിദ്ധാന്തങ്ങളെ അടിസ്ഥാനമാക്കിയാണ് നടപടികളെടുക്കേണ്ടതെന്ന് കമ്മിററി നിർദ്ദേശിച്ചിരിക്കുന്നു. ന്യായമായ നിലയിൽ ജീവിക്കുന്നതിനു വേണ്ട വരുമാനമുണ്ടാകുന്നതിനാവശ്യമായ ഭൂമി—ഇതാണ് സ്വയംപര്യാപ്തമായ കൃഷിഭൂമിയെന്നതിന് കമ്മിററി നൽകുന്ന നിർവചനം. ഒരു സാധാരണ കുടുംബത്തിലെ എല്ലാ അംഗങ്ങൾക്കും ഇതിൽനിന്ന് തൊഴിൽ ലഭിക്കുകയും വേണം. ചുരുങ്ങിയതു് ഒരു ജോടി കാളയെ പോററാൻ ഈ ഭൂമികൊണ്ടുതന്നെ സാധിക്കുകയും വേണം. ഇതാണ് ഒരു കൃഷിക്കാരനാവശ്യമായ ഭൂമിയെന്നതെ പ്രശ്നത്തെപ്പററി കമ്മിററി പറയുന്നതു്.

ഒരു കൃഷിക്കാരന് ചുരുങ്ങിയതു് ഇത്ര ഭൂമി വേണമെന്നു നിശ്ചയിക്കണം. ഇതിൽ കവിഞ്ഞുള്ള ഭൂമികൾ വാങ്ങുന്നതിനെ സംബന്ധിച്ചും കമ്മിററി ചില നിബന്ധനകൾ നിർദ്ദേശിക്കുന്നു

ണ്ട്. എത്ര ഭൂമി വേണമെങ്കിലും വാങ്ങാൻ അനുവാദമുണ്ടായിക്കൂടാ. സ്വയം പര്യാപ്തമായ ഭൂമിയുടെ മൂന്നിരട്ടിയോളം വാങ്ങുന്നതിന് അനുവദിക്കാം. കൂട്ടുകുടുംബങ്ങൾ, ധർമ്മസ്ഥാപനങ്ങൾ എന്നിവയുടെ കാര്യത്തിൽമാത്രം പല പ്രത്യേക പരിഗണനകൾ നൽകാവുന്നതാകുന്നു.

സ്വയംപര്യാപ്തമായ ഭൂസ്വത്തുക്കളില്ലാത്തവർക്ക് പരസ്പരസഹായ വ്യവസ്ഥയനുസരിച്ച് കൂട്ടുകൃഷികളിൽ ഏർപ്പെടാവുന്നതാകുന്നു. ഗവൺമെണ്ട് അതിനു സൌകര്യം നൽകണം.

ഗ്രാമീണജനതയുടെ കടഭാരത്തെ നീക്കംചെയ്യുന്നതിനുവേണ്ടി കൃഷിക്കാർക്ക് പണം കൊടുക്കുന്നവരുടെമേൽ ചില നിബന്ധനകൾ ചുമത്തേണ്ടതാകുന്നു. എന്നാൽ കൃഷിനടത്താൻ വേണ്ടുന്ന മററു കടസഹായങ്ങൾക്ക് ഏർപ്പാടുണ്ടായിരിക്കണം. കൃഷിക്കാർക്ക് എല്ലാത്തരം കടസഹായം ലഭിക്കുകയും വേണം.

കാർഷികത്തൊഴിലാളികളുടെ കൂലി നിശ്ചയിക്കുക, ജോലിയില്ലാത്ത അവസരങ്ങളിൽ അവർക്ക് തൊഴിലിനു വകയുണ്ടാക്കികൊടുക്കുക, വില പരിഷ്കരിച്ച് മററു കൃഷിക്കാരന് ഒരു ന്യായമായ വരുമാനം ഉറപ്പിക്കുക ഇതൊക്കെയാണ് കമ്മിററി നിർദ്ദേശിക്കുന്ന ചില നടപടികൾ.

കൃഷി സംബന്ധിച്ച സ്ഥിതിവിവരക്കണക്കുകൾ തയ്യാറാക്കാൻ പ്രത്യേക സൌകര്യമുണ്ടായിരിക്കേണ്ടതാണെന്നും കമ്മിററി ശുപാശ ചെയ്തിരിക്കുന്നു.

"കൃഷിക്കാരൻെറ പൊതുവേയുള്ള ജീവിതനിലയെ ഉയർത്താതെ ഒരു കാർഷിക പരിഷ്കാരവും ഫലിക്കാൻപോകുന്നില്ല. കൃഷിത്തൊഴിലിനെ കേന്ദ്രമാക്കിക്കൊണ്ടുള്ള ഒരു അടിസ്ഥാനവിദ്യാഭ്യാസപദ്ധതി നടപ്പിൽ വരുത്തിയും ആരോഗ്യത്തെ നന്നാക്കാനുള്ള സൌകര്യങ്ങൾ ഏർപ്പെടുത്തിയും ഗ്രാമപ്പഞ്ചായത്തുകളെ വളർത്തിയും കൃഷിക്കാരൻെറ ജീവിതത്തെ സൌഭാഗ്യപൂർണ്ണമാക്കേണ്ടതാണ്" എന്ന നിർദ്ദേശത്തോടുകൂടി കമ്മിററി റിപ്പോർട്ടു അവസാനിപ്പിക്കുന്നു.

കൃഷിയെസംബന്ധിച്ച സ്ഥിതിവിവരക്കണക്കുകൾ ശേഖരിക്കാൻ പ്രത്യേക ഏർപ്പാടുകൾ ഉണ്ടായിരിക്കണമെന്ന് കമ്മിററി നിർദ്ദേശിക്കുന്നു.

ഇന്ത്യയിലെ കൃഷി ഇന്നും വളരെ നൂററാണ്ടുകാലം മുമ്പുള്ള സ്ഥിതിയിൽ തന്നെ കിടക്കുന്നു. ലോകത്തിലെ പല രാജ്യങ്ങളിലും കൃഷി വളരെ അഭിവൃദ്ധിപ്പെട്ടിട്ടുണ്ട്. ഉല്പാദനം എത്രയോ അധികരിച്ചിട്ടുണ്ട്. ഇന്ത്യയിൽ ഉല്പാദനം അധികരിച്ചിട്ടില്ലെന്നുമാത്രമല്ല, കുറയുകകൂടി ചെയ്തിരിക്കുന്നു. എന്താണ് ഇതിനു കാരണം? കൃഷി വദ്ധിക്കുന്നതിനു പകരം കുറഞ്ഞുവരികയാണ്. കൃഷിയിൽനിന്നുള്ള വരുമാനംകൊണ്ട് ഉപജീവനം കഴിക്കാൻ സാധിക്കണമെങ്കിൽ ഈ സ്ഥിതി മാറണം. കൃഷി ഒരു ആദായകരമായ തൊഴിലായിത്തീരണം. ഇതിന് ഒരു നിയമനിർമ്മാണം ആവശ്യമാണ്. എന്നാൽ നിയമനിർമ്മാണംമാത്രംകൊണ്ടു കാര്യം സാധിക്കുന്നതല്ലെന്ന് കമ്മിററി ചൂണ്ടിക്കാണിക്കുന്നു. സ്വന്തം ഭൂമിയില്ലാത്ത കൃഷിത്തൊഴിലാളികളെ സംഘടിപ്പിക്കാനായി ഒരു പ്രത്യേക തൊഴിലാളിസംഘടന ആവശ്യമാണെന്ന് റിപ്പോർട്ടിൽ നിർദ്ദേശിച്ചിരിക്കുന്നു. എന്നാൽ ഈ തൊഴിലാളിസംഘടന തികച്ചും സ്വതന്ത്രമായി നില്ക്കേണ്ടതുണ്ടെങ്കിൽകൂടിയും നഗരങ്ങളിലെ തൊഴിലാളി സംഘടനയുമായി കേവലം ബന്ധമില്ലാതെ നിൽക്കുന്നതു് ശരിയായിരിക്കുന്നതല്ല.

വില പരിഷ്ക്കരിച്ചും മററും കൃഷിക്കാരന് ഒരു ശരിയായ വരുമാനം ഉറപ്പിക്കുക; വില ഇൻഷൂർ ചെയ്യുന്നതിന് വ്യവസ്ഥചെയ്യുക; കാർഷികോല്പന്നങ്ങളുടേയും വ്യവസായോല്പന്നങ്ങളുടേയും വിലകൾതമ്മിൽ പൊരുത്തമുണ്ടാക്കുക എന്നിവയാകുന്നു കമ്മിററിയുടെ മററു ശുപാർശകൾ.

ഉപ്പുവ്യവസായം.

തിരുവിതാംകൂറിൽ ഇപ്പോൾ 590 ഏക്കർ സ്ഥലത്തു് ഉപ്പുകൃഷി ചെയ്തുവരുന്നു. ഈ സ്ഥലങ്ങളിൽനിന്നും ആണ്ടിൽ 16 ലക്ഷം മന്നു് ഉപ്പു് ശരാശരി ഉല്പാദിപ്പിക്കപ്പെടുന്നു. 1 മന്നു ഉപ്പിന്റെ ഉല്പാദനത്തിനു് ഇപ്പോൾ കണക്കാക്കപ്പെട്ടിരിക്കുന്നതു് 10 അണയാണു്. നികുതി നിർത്തിയതുമൂലം ഗവമ്മെന്റിനു് ഈ ഇനത്തിൽനിന്നും കാര്യമായ നഷ്ടം നേരിട്ടിട്ടുമുണ്ടു്. ഇപ്പോൾ ഇതിൽനിന്നും ഗവമ്മെന്റിനു കിട്ടുന്നതു് 500000 രൂപാ മാത്രമാണു്. യൂണിയൻ പ്രദേശത്തേയ്ക്കു് 20ലക്ഷം മന്നു ഉപ്പു് ആവശ്യമുണ്ടു്. ഈ ഉപ്പു് നാഗർകോവിലിൽനിന്നും കൊണ്ടുപോകുന്നതും ദൂരത്തിന്റെ കൂടുതൽ കുറവനുസരിച്ചു് വിലവ്യത്യാസം ഉള്ളതുമാകുന്നു. ഉപ്പുവ്യവസായത്തെപ്പററി നിർദ്ദേശങ്ങൾ നൽകാനായി ഇൻഡ്യാഗവമ്മെന്റു് ഒരു കമ്മിററിയെ നിയമിച്ചിട്ടുണ്ടു്. ഇൻഡ്യയ്ക്കു ആവശ്യമുള്ള ഉപ്പു മുഴുവൻ ഇൻഡ്യയിൽ ഉണ്ടാക്കപ്പെടുന്നില്ല. ഇൻഡ്യയുടെ ആവശ്യം നിറവേററത്തക്കവണ്ണം ഈ വ്യവസായത്തെ അഭിവൃദ്ധിപ്പെടുത്താനായി സത്വരമായ ആലോചനയുണ്ടു്. ഉപ്പിന്റെ വിലയിൽ നമ്മുടെ യൂണിയൻ സംസ്ഥാനത്തെപ്പോലെ ഇൻഡ്യയുടെ ഇതരഭാഗങ്ങളിലും വ്യത്യാസം കാണുന്നുണ്ടു്.

ചിറവൂർ താലൂക്കിലും തിരുവനന്തപുരത്തും തിരുനൽവേലിയിലും ഒരേ അളവു് ഉപ്പിനു് വലുതായ വിലവ്യത്യാസം കാണുന്നു. താമരഅളത്തിൽ മനൊന്നിനു് 1 രൂപാ 4 ണ.യും തൂത്തുക്കുടി അളത്തിൽ 12 ണ. 6പൈയും വിലയുണ്ടു്. മലബാറിൽ ഉപ്പു് മനൊന്നിനു് 1 രൂപാക്കു കിട്ടുമെന്നുള്ളതും അതിനു സമീപത്തുള്ള യൂണിയൻ പ്രദേശത്തു് മനൊന്നിനു് 2 രൂപാ 4 ണ. വിലയുള്ളതുമാകുന്നു ഇപ്രകാരമുള്ള വിലവ്യത്യാസം നിലനിന്നുപോരുന്നതു് ഗവമ്മെന്റു് ബലവത്തായ തീരുവസ്ഥലങ്ങൾ ഏർപ്പെടുത്തിയിട്ടുള്ളതുകൊണ്ടാണു്. തീരുവസ്ഥലങ്ങൾ സർവ്വവും മാററി ഇൻഡ്യ ഒന്നാകുമ്പോൾ തൂത്തുക്കുടി മുതലായ സ്ഥലങ്ങളിലെ ഉപ്പു് തിരുവിതാംകൂറിലെ ഉപ്പുവ്യവസായത്തെ സാരമായി വിഷമിപ്പിക്കുന്നതാണു്.

തിരുവിതാംകൂറിലുള്ള മഴക്കൂടുതൽ കൊണ്ടു് ആണ്ടിൽ 6 മാസംപോലും രണ്ടുപണികളിലായി ഉപ്പുവാരുവാൻ സാധിക്കുന്നില്ല. നിമ്നോന്നതമായ ഭൂമിയുടെ കിടപ്പുകൊണ്ടും ചാനൽ വെള്ളത്തിന്റെ ഊററുകൊണ്ടും ഉപ്പുവെള്ളസംഭരണ വിഷമതകൊണ്ടും തൂത്തുക്കുടിയെ അപേക്ഷിച്ചു് നമ്മുടെ ഉപ്പുകൃഷിസ്ഥലങ്ങളിൽ കാലോചിതമായി അനവധി പണം മുടക്കി കൃഷി ചെയ്യേണ്ടതായിട്ടുണ്ടു്. ഉപ്പുവെള്ളം ഭൂഗർഭത്തിൽനിന്നും കിട്ടാൻ അനേകസ്ഥലങ്ങൾ കുഴിച്ചു് നിരാശപ്പെട്ടു. ഏതെങ്കിലും ഭാഗ്യവശാൽ രണ്ടോ മൂന്നോ കുഴൽകിണറുകൾ കിട്ടുന്നതിൽനിന്നും എഞ്ചിൻമൂലം പമ്പുവച്ചു് ഇറച്ചുകാച്ചി, വെള്ളത്തെ വിതരണംചെയ്തു് ഉപ്പുവാരുന്ന അളങ്ങളാണു് തിരുവിതാംകൂറിൽ ഉള്ളതു്. തൂത്തുക്കുടിയിൽ സ്വതസ്സിദ്ധമായ വിശാലപ്രദേശത്തു് കടലടികൊണ്ടു കരേറിവരുന്ന വെള്ളം സംഭരിച്ചു് മഴക്കുറവിനാൽ ആണ്ടിൽ പത്തു മാസവും വാരി മുതലെടുക്കുന്ന ഏർപ്പാടു് വ്യവസായികൾക്കു് ഒരു അനുഗ്രഹമായിരിക്കുന്നു. ഇപ്രകാരമുള്ള രണ്ടു വശങ്ങളും, തൂത്തുക്കുടി ഉപ്പിന്റെ ഇറക്കുമതിയെപ്പററിയും ഇവിടത്തെ ഉപ്പിന്റെ വിലക്കൂടുതലിനെപ്പററിയും ഗവമ്മെന്റു് പര്യാലോചിക്കേണ്ട ഒരു പ്രധാന വിഷയമാണു്.

കണ്ണൻദേവൻ തോട്ടങ്ങളുടെ ഉടമ്പടിയെപ്പോലെ പരിഗണിച്ചു് ഉപ്പു

ലൈസൻസികളുടേയും കാലാവധി തീരുന്ന അവസരത്തിൽ ഉടമ്പടി പുതുക്കാതെ സർക്കാരിലേക്ക് എടുക്കാമെന്നുള്ളതും മിക്കവാറുമുള്ള ലൈസൻസികൾക്ക് 30 വർഷത്തിനു മേലുള്ള കാലാവധി തീർന്നിട്ടുള്ളതുമാകുന്നുവെന്നും പ്രസ്താവിച്ചുകൊള്ളുന്നു.

കമ്പനിഅളത്തിലെ കാലാവധി തീർന്നാപക്ഷം അവയ്ക്കുള്ള പൊന്നുംവിലയും കൊടുത്ത് സർക്കാരിൽനിന്നും എടുത്ത് ഒരു വില നിശ്ചയിച്ച് തിരുവിതാംകൂറിലെ ഉപ്പുലൈസൻസികളെല്ലാം ഓഹരി എടുത്ത ഒരു സഹകരണസംഘം രജിസ്റ്റർ ചെയ്യണം. കമ്പനിഅളം സർക്കാർ വകയാക്കി ഭൂരിപക്ഷം സർക്കാരും ഓഹരി എടുക്കണം. ഓരോ അളത്തിലും വിളഞ്ഞുകിട്ടുന്ന ഉപ്പ് ചാക്കൊന്നിന് 2 രൂപാ വിലവച്ച് സംഘത്തിലേക്കു വില്ക്കണം. അപ്രകാരം തിരുവിതാംകൂറിൽ ഉണ്ടാകുന്ന എല്ലാ ലൈസൻസികളുടേയും ഉപ്പ് ടി സംഘത്തിൽനിന്നും യൂണിയൻ പ്രദേശത്തുള്ള സർവ് താലൂക്കുബാങ്കുകൾക്കും ആവശ്യാനുസരണം മുഴുവനും വിതരണം ചെയ്യണം.

ടി. സഹകരണസംഘത്തിൽനിന്നും ചാക്കൊന്നിന് അര രൂപാവീതം കണക്കാക്കി ആണ്ടുതോറും ഗവമ്മെൻറിലേക്ക് അടയ്ക്കണം. ഗവമ്മെൻറ് സെൻറാന്നിന് 2 മന്നു മുതൽ 6 മന്നു വരെയുള്ള നികുതി ഇപ്പോൾ ഈടാക്കിവരുന്നുണ്ട്. അപ്രകാരമുള്ള നികുതി ഏകീകരണംകൊണ്ട് കുറച്ചുകൂടെ കിട്ടാവുന്നതും അപ്രകാരം കിട്ടുന്ന ഇപ്പോഴത്തെ സംഖ്യയായ 500000 രൂപായിൽ കൂടുതൽ വരവായി വരുമെന്നുള്ളതുമാകുന്നു. യൂണിയൻ സംസ്ഥാനത്തേക്ക് 2000000 മന്ന് ആണ്ടോടാണ്ട് ചിലവുള്ളതും ആയതിലേക്കായി പ്രസ്തുത സഹകരണസംഘം 500000 രൂപാ കൊടുക്കുമെന്നുള്ളതും അപ്രകാരം ഗവമ്മെൻറിന് തീച്ചയായും 1000000 രൂപായിൽ കുറയാത്ത സംഖ്യ ശാശ്വതവരവായി തീരുമെന്നുള്ളതും ആകുന്നു. ഇപ്പോൾ മന്നൊന്നിന് ഒന്നേകാൽ രൂപാ വിലയായി പറയുന്നുവെങ്കിലും 1 രൂപാ മാത്രമെ ലൈസൻസിക്ക് കിട്ടുന്നുള്ളു. അളങ്ങൾക്ക് വിദ്യുച്ഛക്തി കൊടുക്കുന്നതുമൂലം വെള്ളം ഇറപ്പിലേക്കായുള്ള ഒരു ചിലവ് വലുതായി കുറയുമെന്നുള്ളതാകുന്നു. ഉപ്പ് ട്രാൻസ്പോർട്ടിലേക്കായി ലോറികൾ, പത്തേമാരികൾ മുതലായ വഹനങ്ങൾ സംഘത്തിൻെറ ഏർപ്പാടിലായാൽ കുറഞ്ഞ ചിലവിൽ നടത്തിക്കാമെന്നുള്ളതും തൻമൂലം സംഘത്തിന് ലാഭം സിദ്ധിക്കുമെന്നുള്ളതുമാകുന്നു. ഉപ്പുകച്ചവടത്തിൽ മുതലാളിമാരായ കച്ചവടക്കാർ അതിരററ ഇടലാഭം എടുത്തുവരുന്നതും അപ്രകാരമുള്ള ജോലി സംഘം ഏറെറടുക്കുന്നതിനാൽ ആ ലാഭം സംഘത്തിനു കിട്ടുമെന്നുള്ളതുമാകുന്നു. ഇൻഡ്യാ ഗവമ്മെൻറ് ആശിക്കുന്നതുപോലെ ഉപ്പുവ്യവസായിക്ക് ഈ നാട്ടിലേക്കാവശ്യമുള്ള ഉപ്പു മുഴുവനും വളരെ കൂടുതലും ഉണ്ടാക്കാൻ കഴിവുണ്ടാകുമെന്നുള്ളതാകുന്നു.

ഉപ്പു ശുദ്ധിവരുത്തുവാനായി സർവകലാശാലക്കാർ പ്രയത്നിച്ചുവരുന്നതിൻെറ ഫലം ഉപ്പുവ്യവസായികൾ മനസ്സിലാക്കി നല്ലതരം ഉപ്പുണ്ടാക്കുന്നതിന് നിർദ്ദേശിക്കാനായി ഒരു വിദഗ്ദ്ധൻ ഉപദേശം നൽകിയാൽ മതിയാകുമെന്നുള്ളതാണ്. ഇൻഡ്യാ ഗവമ്മെൻറ് ഉപ്പുവിതരണത്തെ സംബന്ധിച്ച് നിർദ്ദേശങ്ങൾ നൽകിയിട്ടുള്ളതും തന്മൂലം ഇന്ന ദേശത്തിലെ ഉപ്പ് ഇന്ന പ്രദേശത്ത് വിതരണം ചെയ്യേണ്ടതാണെന്നു നിർദ്ദേശിക്കുമ്പോൾ ഓരോ പ്രദേശത്തും ഉണ്ടാകുന്ന ഉപ്പ് പ്രത്യേക പ്രദേശത്തുമാത്രം വിതരണം ചെയ്യുമെന്നുള്ളതും വലുതായ മത്സരത്തിന് ഇടവരുന്നതല്ലാത്തതും ആകുന്നു. ഇപ്പോഴുള്ള വിലയനുസരിച്ച് 1 രൂപാ ലൈസൻസിക്ക് കിട്ടുമെന്നുള്ളതും 10 ണ. ചിലവുനീക്കി 6 ണ. ലൈസൻസിക്കു ലാഭം കിട്ടുമെന്നുള്ളതുമാകുന്നു.