

ABSTRACTS OF PAPERS

TWENTY-SIXTH ANNUAL SUMMARY OF CHEMICAL LABORATORY REPORTS

By K. DOUWES DEKKER

The preparation of the annual summary and the issue of the monthly reports has been taken over by the Sugar Milling Research Institute, which now attends to the manufacturing data. Meteorological and agricultural data under the annual summary will, as usual, be provided for by the Experiment Station. In consequence of this change certain alterations have been made in the system of setting out the information normally contained in the summary. The number of tables has been increased to give in detail data which had not previously been available.

There were 19 mills in operation during the season, which crushed 5,721,390 tons of cane and produced 685,798 tons of sugar; 17 mills which crushed 98.93 per cent. of the total weight of cane and produced 99.21 per cent. of total sugar contributed to the

summary. In spite of the drought, fibre content was not abnormal but sucrose content was unusually high.

Average extraction for the season was 93.33. Boiling House Recovery was virtually equal to the previous season's figure.

The summary gives attention to exhaustion in final molasses, volume of massecuite and chemical consumption in clarification.

Comparisons are given with previous years' performances. In the general comparison a new criterion, the Boiling House Performance, is used instead of Reduced Boiling House Recovery. The Boiling House Performance is more extensively discussed by the author in "One Year of Weekly Factory Report Data."

ANNUAL WEATHER REPORT FOR 1950

By J. L. DU TOIT.

Rainfall for 1950 at the Experiment Station was only 26.33 inches and, apart from 1941, when 24.35 inches were recorded, was the lowest and worst distributed rainfall since 1926.

Exceptionally dry weather from September to the end of November delayed planting and hampered the growth of young cane.

The mean screen temperature at the Experiment Station was 69.3° F., compared with the average of 68.7°.

The mean true atmospheric pressure at 29.76 inches was equal to the average barometric pressure. Average humidity was 75.8 per cent. saturation at 8 a.m. and 62.7 per cent. at 2 p.m., compared with averages of 73.3 and 62.8 per cent. respectively.

Total evaporation from a free water surface was 49.43 inches, compared with the average of 46.74 inches.

Rainfall during 1950 was deficient for all but two recording stations and the drought was worst in the central section.

NOTES ON THE DEVELOPMENT OF THE SUGAR INDUSTRIES OF QUEENSLAND AND NATAL IN RECENT YEARS

By H. H. DODDS.

No attempt is made to effect direct comparisons between the sugar industries of Queensland and Natal, but their progress is traced broadly over the past two decades.

The conditions under which cane is grown in Natal are described, as are those in Queensland. The Natal sugar industry occupies an area of about 800,000 acres, of which about one-half is under cane and one-quarter is harvested each season. The area under cane in Queensland is 380,000 acres, most of which is harvested every year.

The climatic conditions in the two countries are described in some detail and figures are given of rainfall in the principal areas.

The bulk of cane in Queensland is grown by small holders with an average area under cane of only 62 acres.

The changes in leading cane varieties in cultivation in Queensland and Natal are recorded; the selection of varieties has always been very different in view of the difference in environment.

Comparison is made of production in the two countries, with particular reference to the rapid recovery of the Queensland industry from the setbacks caused during the war years from shortage of labour, fertiliser and materials generally. The corresponding effects of war on South Africa are also briefly discussed.

ONE YEAR OF WEEKLY FACTORY REPORT DATA

By K. DOUWES DEKKER.

The Sugar Milling Research Institute has published weekly reports containing the assembled factory data of all mills in an effort to meet a long-felt want in the Industry. Stress has been laid on the topical nature of publication, and after a year of this procedure it is felt safe to conclude that the reports have been well received.

The data of the reports have previously been used in the Natal sugar industry and do not require special discussion.

The exception to this is the Boiling House Performance, introduced to provide data which expresses the *quality* of the work done by mills in a better fashion than the Boiling House Recovery, which is essentially a *quantitative* data.

The difference between the Boiling House Performance and the Boiling House Recovery data of any one particular mill is due to two corrections: one for the mixed juice end and one for the sugar end of the calculations.

The introduction of the Boiling House Performance criterion sets a target for the quality of the work done by the mills. It is felt that this object is worth striving for and that a hundred per cent. figure will eventually be reached. Attention is given to sugar losses in final molasses, and it is felt that there is probably ample scope for an eventual increase in Boiling House Performance by carefully controlled attempts to reduce the purity of final molasses.

THE DETERMINATION OF SUCROSE IN MIXED JUICE AND CLEAR JUICE BY VARIOUS METHODS

By P. J. LAUBSCHER.

Any modification of the Clerget method of determining sucrose in juices can be correct only if there are no substances present in the juice that have different optical activities under the conditions at which the direct and invert polarizations are read and if no optically active substances are formed from substances other than sucrose during the inversion process.

It has often been asked whether the Jackson and Gillis No. 4 method, which is the official Natal method, gives correct results in all circumstances. It has been suggested that certain non-sugars characteristic of Natal juices might influence results. It has also been suggested that the abnormal fluctuations sometimes observed in the Boiling House Recovery data of Natal mills should be ascribed to this influence.

A series of tests was carried out in the 1950-51 season in an attempt to answer these questions. The Jackson and Gillis No. 4 method of sucrose determination was compared with the Browne and Zerban rapid invertase method, the chemical method based on the determination of reducing sugars in the juice before and after inversion, described by Douwes Dekker, and the apparent sucrose and sucrose determined by the baryta method.

The results of the sucrose determinations are tabulated.

No proof has been found that sucrose determination by the Jackson and Gillis No. 4 method is subject to serious errors due to substances in the juice other than sucrose having different optical activities under the conditions at which the direct and invert polarizations are read.

SOME EXPERIENCES WITH CONDUCTIVITY CONTROL OF PAN BOILING

By A. E. RABE.

The author describes experiments carried out at Illovo with a cuitometer and recorder. A brief description is given of the instrument and its method of use.

The difficulties encountered because of fluctuating voltage, electrode sizes, scaling and circulation are

briefly set out and the method of determining the saturation and "false grain" points is described.

Comparative figures are given of pan yields prior to and after the installation of the instrument. Charts illustrate the improvement achieved in regularity of boiling obtained with the aid of the instrument described.

THE EFFECT OF REMOVING BAGACILLO FROM MIXED JUICE ON SUGAR MANUFACTURE

By K. DOUWES DEKKER and P. J. LAUBSCHER.

This paper sets out the investigation conducted by the Sugar Milling Research Institute during 1950 into (a) the determination of the bagacillo percentage of Natal mixed juice before and after fine straining, and (b) collecting data about the influence of the presence of bagacillo in mixed juice on the manufacturing processes.

The results of bagacillo determinations are given and the influence of bagacillo on sugar manufacture discussed as the result of factory observations at Umfolozi.

Tests showed that fine screening of mixed juice

through a Peck strainer or vibrating screen reduced the content of bagacillo in Natal mixed juice from 0.2 to 0.07 per cent. on the average.

Attempts to study the effect on manufacturing results of a higher percentage of bagacillo in mixed juice were not conclusive.

It was found, however, that when the Peck strainer was not used at Umfolozi the sucrose percentage of filter cake was definitely higher. Some slight inconvenience was also experienced by the factory staff in running the various operating processes.

MULTIPLE EFFECT EVAPORATOR SCALE IN NATAL

By G. C. DYMOND.

No new facts are demonstrated in this paper, which is merely a record of some analyses of evaporator scale in Natal. The object in presenting the paper is to stimulate discussion and formulate a possible plan of co-operative work for the future.

The literature on ash components of sugarcane is enormous and shows that there are raw material variables over which the sugar manufacturer has no

control. The advent of the ion-exchange process however, suggests a way to final removal of this bugbear of sugar manufacture.

Analyses suggest that Natal scale is harder than those examples quoted by Prinsen Geerligs.

The presence of silica, iron and alumina, lime salts, lime as CaO and sulphates is discussed, and variations from the figures quoted by the authorities indicated.

THE USE OF SODIUM HEXA METAPHOSPHATE FOR PREVENTING THE FORMATION OF CALCIUM OXALATE SCALE IN EVAPORATORS DURING THE MANUFACTURE OF SOLID WATTLE BARK EXTRACT

By D. M. RICE.

Scale in sugar evaporators has a different chemical composition from that found in tannin evaporators, but the physical principles are undoubtedly similar.

When the liquor obtained from the extraction of wattle bark is concentrated in multiple-effect evaporators a hard scale consisting mainly of calcium oxalate is formed. This can be reduced in quantity by preventing the introduction of foreign calcium salts.

The addition of sodium hexa metaphosphate has been found to prevent scale altogether, and an excess of metaphosphate softens and removes old deposits.

This paper deals with experimental work in the use of metaphosphate in preventing calcium scale and sets out details of results obtained. These substantiate the belief that metaphosphate inhibits the formation of calcium scale.

ELECTRIC PHENOMENA IN RELATION TO LUBRICATION OF MACHINES

By J. H. HILLIARD.

It is known that when shaft currents pass through an oil film in a bearing, polymerization and oxidation are accelerated and thermal decomposition caused. The oil becomes darker in colour, sometimes increases in acidity and generally deposits a chocolate-coloured precipitate in the oil system. Arcing will cause small particles of metal to flake off and contaminate the oil.

This paper discusses the manner in which shaft currents may be produced. It is shown that if these

currents are of sufficient strength, arcing can occur through the oil film and cause pitting of the shaft and bearing. Electrolysis or galvanic action may cause currents to flow through the oil film without the presence of actual sparking or arcing.

Methods of preventing shaft currents are discussed, together with tests for leakage currents and static charges.

SUGGESTIONS AS TO THE USE OF PIPES IN THE DISTRIBUTION OF IRRIGATION WATER AND THE COMPARISON OF COST BETWEEN THE CONSTRUCTION OF FURROWS AND THE LAYING OF PIPES

By C. H. O. PEARSON.

This paper compares the advantages and disadvantages of irrigation water distribution by means of pipes and furrows. Costs are given for both systems.

The installation of piping provides both an alternative method of application and a saving in water.

Reference is made to the ease of control of water in pipes and to the use of overhead sprinkler methods of irrigation. It is suggested that the full development of water under pressure in pipes needs further investigation.

A PRELIMINARY NOTE ON THE INCREASE OF AVAILABLE PHOSPHATE IN ROCK PHOSPHATE BY COMPOSTING

By G. C. DYMOND.

This brief paper gives the results of experiments carried out on increasing the availability of P_2O_5 through composting, using 'Langfos' rock phosphate.

It is shown that availability is appreciably increased and the resulting phosphate less susceptible to fixation in the soil.

SUGAR RESEARCH IN THE WEST INDIES

By A. C. BARNES.

After dealing with the historical aspect of sugar research in the West Indies, the paper goes on to describe in some detail the work accomplished and the principal lines of investigation now being pursued.

The paper is divided into sections dealing with field and factory research and the various aspects are briefly discussed.

Sugar research in the British West Indies is active, progressive and practical in outlook and is associated with unrestricted exchange of information. Research workers enjoy the greatest possible freedom within the scope of defined policies of investigation.

POTASH: A NEGLECTED FERTILISER?

By J. L. DU TOIT.

South African soils are notoriously deficient in phosphates and field trials in the sugar belt have clearly demonstrated the importance of phosphatic and nitrogenous fertilisers.

Early experiments pointed to the importance of potash as a cane fertiliser, but later ones offered no conclusive results.

Potash deficiency symptoms are now becoming more common in cane, and leaf analyses and growth

measurement experiments indicate that potash-deficient areas do exist. There are indications that germination and subsequent growth may be adversely affected by using potash-deficient plant material.

Field trials indicate that potash top-dressings have at times an outstanding effect on cane yield as well as on sucrose per cent. cane.

METHODS AND RESULTS OF SUGARCANE MOSAIC RESISTANCE AND TOLERANCE TESTS

By N. C. KING.

This paper defines some of the most commonly used virus and mosaic terms. It describes the methods used and the results of a tolerance trial planted in January, 1949.

A method for the preliminary testing of sugarcane varieties against mosaic is given which shows promise of being quantitative as well as qualitative.

Results of the trials show that N:Co.310 and Co.301 are not tolerant, but that N:Co.291 and Co.281 are tolerant, though very susceptible.

The danger of possible virulent strains occurring in Natal is discussed.