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MAZOE DAM AND CITRUS ESTATE

PREFACE

I commenced making field notes and collecting information about the Mazoe Citrus Estate shortly after we moved into a University house overlooking the Dam in 1958 and I have visited various parts of the Estate from time to time from 1956 onwards in the company of the General Manager or one of his staff. The area of the orchards (the second largest in Southern Africa), its contribution to the economy of the Mazoe Valley and to Rhodesia and its long history warranted a lengthy publication. So far this has proved difficult if not impossible to accomplish if only because all the original and only records kept by the British South Africa Company were held in London where they were destroyed by one of the German air raids in ~~1940/41~~ the winter of 1940/41. Also since November 1965 following Rhodesia's declaration of Independence, information pertaining to agricultural and horticultural production is classified, particularly important export crops like citrus.

The rapid and continuous development of the Estate following the acquisition of the adjacent Frobisher Estate in 1958 and during a period of political tensions, economic squeeze and takeover of the original Company by

provide an interesting milieu in which the Estate has operated in recent year.

Some day the available information will have to be collated, sifted and digested and written up for publication. In the meantime herewith are a few notes which have been revised from time to time in order that they may have current interest.

University of Rhodesia

Department of Agriculture

Occasional Paper

MAZOE DAM AND CITRUS ESTATE

Notes prepared by A.G. Davis
Professor of Agriculture

(1971)

I SITE

The Mazoe Dam stands 25 miles (40.2 Km) north of Salisbury, at a point 17°31' South latitude, 30°59' East longitude. The wall of the dam stands in a gap in the Iron Mask Range which rises to over 1 000 feet (305 metres) on both sides of the Poort. Erected in the form of an arch with spillways at either side, the top section is anchored down through the wall to the foundations by means of a million feet (305 000 metres) of high tension steel wire. The centre of the arch of the wall is 113 feet (34.5 metres) above the bottom of the river and the wall is over 500 feet (152.5 metres) in length.

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Four gate valves manually operated from the top of the wall control the release of a maximum of 90 cusecs (2.55 cub. met. per sec.) of irrigated water to three lined furrows leading out of the right bank. One furrow carrying 33 cusecs (0.93 cub. m/sec.) commences at Watts Weir in the bed of the river downstream of the wall and runs 17 miles (27.3 Km.) through the oldest part of the Citrus Estate to near the Glendale-Bindura railway. Of the two furrows which commence at the wall, one carrying 11 cusecs (o.31 cub. m/sec.) serves the upper part of the right (east) bank of the Estate, while the other carrying 45 or 46 cusecs (1.27 cub. m/sec.) passes into a 42 inch (1067 mm) syphon under the river to serve the left (west) bank.

A foot bridge from the left bank over the spillway provides access to the top of the wall and the wheels of the gate valves. The wall is floodlit at night.

The highway crosses the Iron Mask Range on the west side of the dam wall providing an advantageous view of the wall and spillway and of the beds of quartz iron oxide rock known as banded ironstone in the cutting on the other side of the road.

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II SURFACE AREA AND CAPACITY

Area of the water in the dam at full supply level, i.e. the level of the spillways, is 4 140 feet (1 262.7 m.) above sea level, is 1 100 acres (440 Ha) holding 28 473 acre feet (35 135 680 cub. met.) or 7 820 000 000 gallons. The water overlies the original confluence of the Mazoe and Dassura Rivers. The dam ponds back the water over 5 000 yards (4 570 m) up the Mazoe River and nearly as far up the Dassura when water is cascading over the spillways. Along the northern side it is 180 yards (164.5 m) wide.

The land surrounding the lake is all owned by the Mazoe Citrus Estate apart from small portions of Spelonkin Farm and the University College Farm on the south side.

Normally the level of the water in the lake early in the rainy season does not commence to rise until some 20 inches (508 mm) of rain has fallen in the catchment area. In 1965 following heavy storms in the area the dam overflowed on 22nd January.

Average rainfall over the lake surface is 35.80 inches (909.3 mm) (25 years 1918/19 to 1945/46) ranging from 17.47 inches (443.7 mm) in 1923 to 56.12 inches

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(1 425 mm) in 1942/43 when 18.86 inches (479 mm) fell in January.

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III PURPOSE of the Dam

The dam provides irrigation water for the Mazoe Citrus Estate, the irrigable portion of which lies north of the dam down either side of the Mazoe River - a distance of some 7 miles (11.2Km) to the Factory on the right bank. The Water Court permits the abstraction and use of stored flood water on a maximum of 6 615 acres (2 679.1 hectares) of irrigable land which would enable the Estate to expand during a period of years to 400 000 trees/ in September, 1961. During April, 1967, 3,700/ acres (1,4 98[illegible] hectares) of land were under irrigation.

1 from 125,000 trees

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IV CATCHMENT AREA

The catchment area for the Mazoe Dam comprises two drainage basins, the upper Mazoe and the Dassura Rivers, together totalling 129 square miles (208.4 Km) north of Salisbury in the shape of an equilateral triangle with the southern side lying within 3 miles (4.8 Km) of the city boundary. The plateau portion nearest the city is representative of King's African cycle of erosion which falls away steeply on the north with the fingers of the tributaries of the Mazoe and Dassura Rivers eroding upstream providing fine examples of the edge of the Post African landscape.

The eastern quarter of the catchment area lies on the granite, much of it typical "castle-kopjes" country being the cappings of great batholiths. Along the margins or contact with the Greenstone Series and the Iron Mask Series of the Basement Schists there are numerous old gold mine shafts, a few of which serve as sources of water for small irrigation schemes. These, together with boreholes and weirs on the upper Mazoe, provide water for irrigating vegetable and potato crops grown in small isolated pockets of heavy soil and which are sold in Salisbury.

The remainder and larger portion of the catchment comprises deep red soil derived from Dolerite and heavy red soils of the Salisbury Series overlying

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intrusive epidiorites of the Greenstone Series of the Basement Schists and much of it is remuneratively cropped with hybrid maize seed production in rotation with sown grass pastures, legume green manure crops and maize for silage, coupled with a few but large herds of beef and dairy cattle. Plantations or belts of gums, Eucalyptus, on vlei soils too wet for arable cultivation, dot the landscape.

and more recently soya beans irrigated wheat

Over a period of 28 years the average run off in the Dassura Catchment Area of 70 km² (27 square miles) was 6.4 inches (163 mm) with a low of o.61 inches (15.5 mm) in 1950/51 and a high of 16.19 inches (411.2 mm) in 1938/39.

new para IN addition to the water supplied from the catchment to the Dam, the Estate also receives water from the Tatagura River which joins the west bank of the Mazoe River immediately below the Dam. This water, together with part of the water which is released into the bed of the Mazoe River, is picked up down-stream at Watts Weir and diverted into the lower and oldest canal serving the east side of the Estate. The catchment of the Dassura River covers 27 square miles (~~6 998 Ha~~ 70 km²).

The Tatagura Catchment Area covers 63 km², and being without any dams in its lower sector, the water available to the Estate is normal stream flow.

All three catchments carry Water Rights (seasonal) for farm properties lying up stream from the Citrus Estate so that it does not have

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p7 cont'd

prior use to all the water in the total catchment of 400 km². Furthermore the Water Court ~~regulates~~ restricts the quantity and time during which these Right can be exercised so that the Mazoe River below the Estate carries a flow of water at all times thereby ~~serving~~ also serving riparian owners further down river.

V CITRUS ESTATE

The Mazoe Citrus Estate covers 81 square miles or 51 840 acres (20 995.2 Ha) including land on both sides of the lake and on both sides of the Highway for a distance of 4 miles (6.44Km) north of Mazoe Post Office. From the Highway one obtains a fine view of the more recent plantings (1960) of Valencias.

In November 1964 there were 233 000 trees with 150 000 bearing averaging 100 trees per acre (18 x 24 feet) (5.49 x 7.32 m) over 2 600 acres (1 053.0 Ha). By September 1965 the number had decreased to 240 000 orange trees and 20 000 other citrus trees. A year later the grand total of all trees was 274 000. The bulk of the citrus trees are Valencia oranges which are processed in a factory on the Estate and the juice sold in wooden barrels for export (as at 1965).

and by late 1971 it was 306 000 citrus trees on 3 850 Acres

The other citrus includes about 10 000 lemon trees, some naartjies, tangelos and limes* and 1 000 grape fruit. Washington Navel Oranges and the larger fruit of other varieties are also sold on the local market. An exhibit by the Citrus Estates at the Salisbury Agricultural Show included 29 varieties of citrus.

~~The Mazoe Estate annually plants two to 3 000 ½ acres (½ 810 - 1215 810 Ha.) of maize using hybrid seed. There is also a small acreage (10) of vines producing table grapes. On the east side of the Iron Mask Range there is a breeding~~

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* In June 1968 the older lime groves below the road on the east bank were severly frosted. A new block of limes high up on the east side was planted in 1971 with (110 Acres?) a target of 30 000 trees by late 1972.

herd of Afrikanders kept on the property Glenbervie, the access to which is through a narrow col in the mountain range. During winter months cattle are fattened in yards which lie west of the Factory. Their rations include citrus pulp, together with maize.

Deep dark red soils of the Greenstone Series are characteristic of the valley soils on which the citrus trees grow so well - indeed some of the trees on the east bank are reputed to be at least 40 years old. On the heavy silty vlei soils of Tatagura origin widely spaced tile drainage at depth has been installed with marked success in terms of tree growth and yield of fruit.

two groves were planted in 1912 and 1913 respectively

SOILS

Apart from a ~~few~~ trees grown along the east side on the ~~bas~~ slopes of the Iron Mask Range the orchards stand on soils Fersiallitic ~~of the~~ (5E) previously known as derived from the Greenstone Series being deep reddish brown clays formed on basic rocks. They are fertile highly productive soils with a stable granular structure capable under good management of sustained production. Indicative of this is the existance of two orange groves planted in 1912 and 1913 respectively. In at-least two new groves planted in 1961 alongside of the Highway, the high water table neccessitated the installation of tile drainage which proved very satisfactory

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VI HISTORY

In 1912 a syndicate - Messrs. McIllwaine, Simpson and the British South Africa Company - constructed a take-off point, now Watts Weir, downstream from the present dam wall and below the confluence of the Tatagura and Mazoe rivers. A canal carrying one cusec (.0283 cub.m/sec.) led out on the right bank to Smithfield and Brundrett farms planted with citrus groves. Relying on normal river flow, not more than 50 acres (20.3 Ha.) could be adequately irrigated, particularly in years of low rainfall. In 1914 the B.S.A. Company became sole owners of the property and embarked upon a programme of citrus development involving a storage dam, canal construction, laying out of a further 1 500 acres (607.5 Ha.) under citrus on these farms followed by the purchase of lands on the farms Bloomfield, Clifton, Virginia and Sleamish along the right or east bank of the river. During 1919-20 a concrete constant-radius arched dam was built 100 ft. (30.5m.) in height in the Poort where the Mazoe River pours through the Iron Mask Range. The top of the two spillways on either side of the dam were 4 130 feet (1 259.7m.) above sea level. Later in 1960-61, the dam was raised by a further 10 feet (3.05 m.). The original area of the lake was 790 acres (320.0 Ha.) with a capacity of 17 500 acre feet (21 595 000 cub. met.) or 4 750 000 000 gallons. The stored water passed through 4 sluice

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gates in the centre of the wall either to be led down the east side of the citrus estate in an open furrow, or permitted to flow down the bed of the river to be picked up at Watts Weir, also to be led down the east side in an unlined furrow (Randall, 1923). The present diversion weir and head gate were constructed in 1926 when the initial canal capacity was increased.

In addition to evaporation losses of water from the dam surface rising to 96 inches (2438 mm) in a long dry year, losses from seepage in the canals were as high as 44 percent, and at one time in the early forties following a series of dry years the dam was all but empty. Lining of the furrows commenced in the late fifties and these comprised 27 miles (43.4 Km) of main irrigation canals in May, 1967, 16 miles (25.7 Km) of main furrows and a network of subsidiary furrows which extends to every tree. The original Estate was increased by a further 6 000 acres (2 430 Ha) of land which necessitated the raising of the wall and increased storage, coupled with a further 15 miles (24.1Km) of canals and syphons, altogether costing some $800 000. This additional 6 000 acres (2 430 Ha) is on the west side of the river and water is led to it by means of a new high level canal on the east bank to a syphon under the Mazoe River to a canal which

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serves the citrus on either side of the Highway. An electric pumping station on the canal alongside the Highway raises water to the trees on both sides of the road leading to Amandas-Concession.

The original dam wall cost $264 516 in 1920. Raising it in 1961 added a further $280 000 to the construction cost. The expansion since 1960, including the raising of the wall has entailed a further investment in the Estate of the order of $8000 000. In 1965 the Citrus Estate passed from the control of the British South Africa Company to a subsidiary of the Anglo American (Rhodesia) Limited, known as AMRHO.

A commanding view of the citrus plantations and dam may be obtained from the summit at 4 985 feet (1502.4 metres) of an outlier of the Iron Mask Range behind the Mazoe Hotel, site of ancient gold workings including the Bernheim group. The climb, preferably in and Landrover, reveals some magnificent scenery of the surrounding topography of particular interest to students of geomorphology, land use and vegetation.

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VII CULTURAL REQUIREMENTS OF CITRUS

Details of the temperature requirements, suitable soils, root stocks, nursery management, land preparation and layout of orchards, spacing, planting, cultivation, irrigation, fertilization, pruning, harvesting, together with diseases, pests and their control, are fully described and illustrated in Tech. Bul. No. 7 of the Rhodesia Agricultural Journal, 1969.

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VIII THE FACTORY

The processing factory was established in 1930 prior to which date all the fruit was sold locally or exported as whole fruit through Beira to the United Kingdom. During the picking season the factory is open to visitors on Thursday mornings. The operations reveal remarkably efficient techniques whereby oranges are converted to juice, cattle food and oils. A $800 000 evaporator was installed in mid-1965 for handling 14 000 tons (12 700 metric tons) of fruit in that year, producing some 140 000 gallons (636 440 litres) of concentrated juice and 113 000 lbs (51 302 Kg) of oil.

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IX PERSONNEL

The Estate employs some 65 Europeans and about 1 200 Africans, all of whom are provided with medical

XI CALCULATIONS

Yield of an orange tree in lbs = age of tree x 10 x 10. e.g. a tree 30 years old (30 x 10 x 10) yields 310 lbs (140.7 Kg). A pocket weighs 30 lbs (13.6 Kg). South African export case weighs 70 lbs. (31.8 Kg). A fully mature tree produces some 700 fruit. The water requirements of a tree is based upon a figure of 3 acre feet (9 144 cu.m/Ha) per acre and this amounts to approximately 9 000 gallons (40 914 litres) per tree.

1 acre inch = 3 630 cu. ft.
= 102 8 cu. met.

= 3 630 x 6.24
= 22 650 gallons

1 cusec = 6.24 galls/second
= 0.283 cu.met./sec
= 375 galls/minute
= 22 650 galls/hour

X WATER RIGHT NO 90

The Right of Priority is dated 29th September, 1922, in respect of the storage of 4 900 000 gallons (22 825 cu. met.) and the entitlement from normal flow. A further Right is dated 9th February, 1960, in respect of additional storage of 2 900 000 gallons (13 182 cu.met.).

XII ACKNOWLEDGEMENTS

I am indebted to Mr. D. Archer, Surveyor of the Citrus Estate, for supplying me with information while showing me over the Estate on numerous occasions. Without his help these notes could not have been written. For permission to visit the Estate, my thanks go to the Managers, Mr. Crous, and his successor, Mr. Meyring.

All the early records of the Estate were kept in London where they were destroyed during an air raid in the 1939/45 War.

REFERENCES

Archer, J.D. (1967)	Development of the Mazoe Citrus Estate.Proceedings Rhodesian Institute of Engineers,pp 561-565.
Archives	Various papers.
Citrus	Barclays Bank DCO Report p 66
Citrus Experiment Station Reports 1932	British South Africa Company
Citrus	Citrus in Rhodesia 1969. Rhodesia Agricultural Journal Tech. Bal. No. 7 by staff of the Mazoe Citrus Estate and Ministry of Agriculture, pp 30.
Rhodesia Herald	Various articles
Henderson RW 1962	The raising of the Mazoe Irrigation Dam, Rhodesian Engineer.
Randall, M. (1923)	On the Mazoe Irrigation Dam Minutes and Proceedings of the Institute of Civil Engineers, pp 314-327

9. PERSONNEL

The Estate employs some 65 Europeans and about 1,200 Africans, all of whom are provided with medical and social amenities.

10. WATER RIGHT NO. 90

The Right of Priority is dated 29th September 1922 in respect of the storage of 4,900,000 gallons and the entitlement from normal flow; A further Right is dated 9th February 1960 in respect of additional storage of 2,900,000 gallons.

22,825 cub met

13,182 cub met

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LIVESTOCK

Cattle have been carried on the Mazoe Citrus Estates throughout the entire period of its operation from before the First World War when they were used as oxen for cultivation in the orchards, providing kraal manure for the trees, transporting the boxes of fruit on waggons to the railway siding at Garvin and finally ration meat for the Estate's employees.

A Friesland herd was established to provide fresh milk for the staff and it was kept on the Farm Glenbervie on the east side of the Iron Mask Range until the mid sixties when it was dispersed following a change in policy initiated by the appointment of a new General Manager who found that it was not a profitable enterprise at the time.

In 1966 it was decided to put the cattle enterprise on a full economic footing as a commercial undertaking involving the utilization of the large and increasing amount of "peel", which was previously dried and sold, continuing to provide kraal manure and producing a profitable carcass. Earlier in the fifties it was based upon an Africander breeding herd mated to Hereford and later to Sussex bulls which were ranch managed on some 14 000 hectares on the east side of the Iron Mask Range and used purely to provide ration meat. For this purpose some 1 500 head were slaughtered annually. Charolais bulls were introduced in 1966 enabling comparison to be made between the Sussex/Africander and Charolais/Africander crosses. The aim has been to implement a criss-cross policy in order to achieve the maximum benefit

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of hybrid vigour so that by 1973 the cattle enterprise was made up of herds of Africander, Sussex and Charolais cows over 2 000 head and their progeny and the progeny of various crosses all of which eventually go into the new feeding yards. These were erected in 1966 between the Factory and the Highway together with a series of large trench silos to hold the pulp peeled from the oranges. (See and compare aerial photos at 1/25 000 for 1965 No. 1365 with 1973 Salisbury North No. 878 which shows the development which has taken place at the site of these feeding yards)

On the occasion of a visit to the Estate in October 1969 the pens contained 625 cattle head of , being fed on orange peels as a pulp from the silos together with corn and cob meal for the feeders. My field notes record a ration for cows of 48 lbs orange pulp per day plus 6 lbs veld hay and 1 lb protein supplement. The ultimate objective of making a profit from the cattle enterprise was achieved in 1973. In the meantime the Charolais grade bullocks from the Estate were awarded prizes at the Mazoe Valley and Salisbury shows.

An early photograph of transport on the Estate published in 1923 shows ~~eight~~ eight mules inspanned into a trolley, alongside of a 16 span of oxen on a waggon and a steam-driven iron wheeled lorry, all loaded with boxes of oranges. Mule trollies are still used although to a limited extent. Mules have always been purchased, not reared on the Estate and owing to their hardiness and long lives they have been able to compete with more modern forms of transport involving short hauls.

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In contrast to deciduous fruit orchards in Europe, sheep are rarely if ever used for keeping down the grass and weeds in Citrus orchards in Rhodesia, at least there does not appear to be any records to the contrary on the Mazoe Estate. There is little doubt however that one or more flocks of sheep were put into the orchards for this purpose if only to satisfy the wishes and advice of the string of peripetatic directors who came out from England between the two Wars.

Mazoe Citrus Estate
Notes from conversation with Des Archer, 26 Ap 67

Dam reinforcement designed to be able to raise the level by 5 to 10 feet above the "new level" which exists at this date. Now water is 14 in below (spillway present)

Water requirement of trees based upon 3 acre feet

Area now under irrigation 3700 acres

Canals new canals west side of river serves more than 3 trees per foot of canal whereas planned extension on E side down to Railway would only serves over 1 tree per foot of canal.

Old canal from weir presently serves largest number of trees – it is lined to about 1000 yards beyond turn off to Iron Duke Mine

East bank canal from Dam is lined as far as the road crossing the Col to Glenbervie It does not spill out at the end into the lower canal

New West bank canal lined all the way

1st pumping station on Highway now working to serve citrus N of Concession Rd N and S of

2nd pumping station to be built where canal crosses road N of (doctors turn off to) house & pipe will lead to a kopje N of the doctors clinic & serve 2 canals on W Spitzkop

The nursery on E side of Highway is served from a secondary canal from the new main one which will eventually serve Cornucopia on W side of Highway

Soil there is a detailed survey of land N of Iron Duke Mine road turn off – there is a much less detailed survey of soils in the new scheme W of the Mazoe River

40 bore holes on estate

Refs Randall M Min Bureau Inst Civil Engineers CCXVI Dec 1923
Henderson RW Pr Rhod Engineers 6.5 M 1962
Major Cooper ESC also March 1962 President this year

Mazoe Dam 1965 Dry Season

Level dropped from overflow less than

8 feet

Level commenced to rise by mid Nov 1965

following rains early in the catchment area. Then droped again in early Jan 1966 by 28th Mar. level was over 2 feet below overflow & 30.23 inches had fallen on Col Farm

1967/68

Level Dropped through Jan into Feb 16-18 ft below spillway

MR Archer has the exact figures

Static by early March when we had had 16 inches

Dryseason 1968

Late Aug level 19 feet below spillway expected to drop another 21 feet. 31st Aug Mr Megrin Gen manager reported Dam 39% full & due to drop to 5 000 Acre Feet before commences rising in Dec or earlier

Ctm 26 May 67

patrol Coupons

are at the base of the dam - these have never been opened in recent years as there is some 16 feet of silt at the base of face of the wall.

All 4 stop cocks which let water out of the well have new valves put in when the wall was raised. The 2 releasing water down river had an air lock in the old valves which caused vibrations in the wall, so drained the well & bored in 2 holes + a pipes up o- the well & release the air

Top of main wall comprises 13 feet of stone & cement between the blocks which acted as shuttering. The cables merely anchored down the old wall - see Hendersons diagrams many more at both ends & thru the spillways than in the centre of the wall

Seepage at Rhosdale Hatcher reckoned 3 Cu Secs was very bad prior to raising the wall when additional grouting was pumped in o- 2 inch holes during & after raising the wall including both banks + across the road. Some holes vertical some at an ∠ giving this effect

Hatcher has a map showing pressure gradients for each hole when pumping in the cement grout indicating that the rock was v. fractured called gossan

247.11
1070000
used 16000 cu feet of grouting for this purpose

A band of green stone crosses the Poort slightly below the main dam & this appears to be overlain by the spillways. The original siting of the old dam was too far down stream so that the best use of abutments of both ends of the wall could not be made as when raising the dam they are below the Poort instead of being above it (see Hendersons diagram p 22)

Raising the water level could have over turned the Dam & either a second thickness of wall had to

Citrus Estate Visit 26 May 1967

Ref see T.D. Archer Development of the Mazoe Citrus Estate
Proceedings Rhodesian Institute of Engineers
5 No 3 1 May 1967 (pp 561-565)

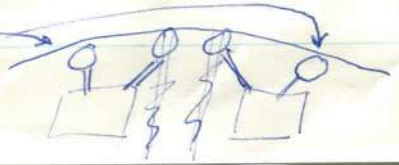
Canals - high level serving part of W bank carries 11 Cusecs when full is fed by a 10 inch iron pipe from base of dam which can be seen on the lower side - The pipe connects with the well inside the dam. If the water level drops some 50 feet there will not be any head to feed the canal as the head of the canal is only some 50 feet below spillway The inlet to the pipe is controlled by wheel stop cock over the well on the East side

- The 2nd larger high level canal carries 45 Cusecs commences at the dam & travels about a mile before crossing to the West bank of the Mazoe R thru a syphon 42 in in diam This canal is fed by an 18 inch iron pipe also from base of dam likewise when the water in the dam drops some 50 feet there will be no head. Entrance to the pipe is from the well inside centre of dam controlled by a wheel stop cock chained to the one above.

- The 3rd low level canal commencing at Watts weir carries 20? cusecs runs along West bank to near the railway line. It has an asbestos cement lining to just beyond road to Iron Duke Mine where it goes under the yellow jacket by a syphon. Water comes from the Talagura R to Mazoe Dam by 2 wheel stop cocks on the centre of Dam over the other well (E side) These are opened at 1 pm at night closed at 1 pm mid day whereas the other two are opened & closed at 4 pm & 4 pm respectively

The two wells inside the Dam wall each have a gate

The two wells inside the dam wall each have a gate valve on the u/s per face of the dam some 20 feet above the bottom eg



The other 2 wheels control the flushing of silt either into the wells or to the dam wall I forget the valves

be built above or below the old one & bonded into it or the old wall had to be tied down into the quartzite foundations which is about 5 feet below the bed of the river with the gossan very deep thick on either side

Weep holes in the spillways were put in as well as French drains to prevent water uplifting either sides of the dam.

The original wall is solid concrete thru which the cable holes had to be drilled

Note Min Water Dept. gives Mazoe catchment as 86 sq miles
The Dassuna as 27 sq miles ? Talagura
hydrological data given on computer sheets Consult Mr Wannell.
Capacity of Dam at spillway level 28473 Acre feet. In raising spillways knocked off old caps added 10.5 feet & original so gross increase was only 10 feet

Lowest N end of estate carries 4000 trees ? Canal from Watts Weir only large enough to serve existing plantings so plan is to put in a night storage dam beyond Yellow Jacket River & then lay a new lined canal below the existing unlined furrow - filling this dam at night time - new canal need only be 10 to 15 cu secs.

Area surrounding Doctor's Surgery will require 6 x 50 HP pumps pushing water 1000 yards up 300 feet. This should serve 140 000 trees ?

In 1961 ? Civil Engineering Contractors M. Gonella & Co Ltd erected a Factory on the Citrus Estate where 63 feet of spun pipes 42" inside diameter were mnf on site, cutting the cost of transporting the finished products

DRAFT

CROPS OTHER THAN CITRUS

Early reports record the growing of numerous crops on the Estate, both dryland and irrigation. Under the former were maize, tobacco both Virginia and Turkish, cotton, ground nuts, linseed, potatoes, beans and sunflowers. On the later were wheat, oats, barley, lucerne, onions, vegetables and certain grasses. A technical paper on rice production in Rhodesia is based upon a study of the crop on the Estate.

Various tropical fruits other than citrus have always been grown in the gardens of the staff working on the premises but only a few of them have been planted for commercial purposes. These include avocados of which there were 2 000 trees in 1971 and at that time some of the fruit was being marketed for export. There are some 100 trees of litchis and 500 trellised vines of granadillas. Pecan nut trees and macadamias are still in the experimental stage of development. A small vineyard - 10 acres was established some years ago for production of table grapes, such as Muscat Hambro and Queen of Vineyard. Some wine varities are also being tested.

Maize has always been grown on the Estate for the provision of rations and feed for the cattle. A figure of 2 000 acres was recorded in 1961, 1 840 acres in 1969, 2 200 in 1970 and 3 000 in 1971. Yields have increased in recent years, thus in 1969 it averaged over 35 bags per acre, and it will go higher now (1973) that sprinkler irrigation has become available for summer supplementary coverage on part of the arable lands. One of the very first corn combines operating in Rhodesia was used on the Estate in the mid-fifties. The Estate also abandoned open pollinated varities and adopted hybrids when they became available early in that decade.

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Cover crops were used in the rotation with maize and a figure of 1 000 acres was recorded for 1961. This figure may include the small area devoted to planted pastures.

No wheat was grown during the decades of the fifties and sixties, not until 1973 when a large block of land over 700 acres