Agriculture in Southern Africa - Part 2—Rhodesia and Belgian Congo

G. H. Burvill

Follow this and additional works at: https://researchlibrary.agric.wa.gov.au/journal_agriculture3

Recommended Citation
Available at: https://researchlibrary.agric.wa.gov.au/journal_agriculture3/vol6/iss1/9

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 3 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au, paul.orange@dpird.wa.gov.au.
A week spent in Salisbury, the capital, and surrounding areas enabled me to see something of farming, the soil conservation and extension work among farmers, as well as agricultural research at the Henderson Research Station, and the Grasslands Research Station. Mr. C. A. Murray, Director of Soil Conservation and Extension, his staff, and other officials arranged a most useful programme.

SOILS AND AGRICULTURE

Southern Rhodesia lies between latitudes 16° and 22° S., i.e. its northern parts are

in the latitudes of Wyndham (Western Australia) and Cairns (Queensland) and its southern portions in the latitudes of Onslow (Western Australia) and Mackay (Queensland) (see Plate 3). It is mostly 3,000-5,500 feet above sea level, however, so that the climate is more temperate than corresponding latitudes in Australia. There is lower and much hotter country in the south and south-east in the drier valleys of the Limpopo and Sabi Rivers and their tributaries, and in the Zambesi valley on the north-western border.

The areas used for farming by Europeans are in the higher country between Bulawayo and Salisbury and from

* See "World Crops" March, 1955, p. 124.
NORTHERN & SOUTHERN RHODESIA

Showing Travel Route and Centres Visited

SCALE — MILES

Plate 3

Journal of agriculture Vol. 6 1957
for knockout tractor performance you need the

HEAVYWEIGHT CHAMP OF TRACTOR TYRES

You pay no more but you get lots more! More working weight, extra rubber and rayon mean extra hours and acres of work. Right through the range of rear wheel tyre sizes, Dunlop makes lightweights of all the others.

Compare the weights of 14 x 28 tyres —
TYRE A ... 155 lbs.
TYRE B ... 175 lbs.
DUNLOP OPEN CENTRE ... 195 lbs.

Get the Heavyweight Champ for your tractor, get extra value—

DUNLOP OPEN CENTRE TRACTOR TYRES
THE GREATEST GRIP ON EARTH

Please mention the "Journal of Agriculture, W.A." when writing to advertisers
Salisbury to the eastern borders round Umtali. The annual rainfall is 12 to 25 inches in the southern parts and 25 to 40 inches in most of the remainder. Higher rainfall occurs on the mountainous eastern border.

I saw only areas within 50 miles of Salisbury and here winter frosts are quite common and severe. There are large areas of sand veld—gently undulating country with grey sand and sandy loams overlying ironstone gravel layers at about a foot, and with grey and yellow clay at depths of one to two feet. These soils are largely used for tobacco growing (175,000 acres per year) but pastures and crops in rotation are the objective, as a tobacco farmer may have 800 acres of land, and grows his 40-50 acres of tobacco on new land each year. The sand veld carries small trees (Brachystegia sp.) and grass. The soils are formed from granite or similar rock, and closely resemble many of the scrub plain soils in the Western Australian wheatbelt e.g. Wongan Hills Agricultural Research Station. The Western Australian soils, also formed from granite, are believed to be relics from a climate which was much wetter than the present 12 to 20 inch rainfall.

Maize is the principal food crop in Southern Rhodesia and forms the staple diet of the natives, supplemented with some meat, peanuts, and beans. Attractive red-brown loams and heavy soils formed from dolerite are favoured for maize. Citrus fruits, with irrigation, do well. Experiments with irrigated sugar cane in the Sabi River valley, have given phenomenal yields. I was told of yields up to 130 tons of cane per acre. Although I did not visit the area, I judged from discussions that the Sabi Valley Research Station probably has conditions similar to the Kimberley Research Station, on the Ord River in the far north of Western Australia.

Cattle and pigs and dairying are important livestock activities. It was interesting to see steers being fed in yards during the dry winter period when natural grasses and crop residues are of poor quality. Silage and hay are fed and the yard manure later carted out to spread on the maize lands. Native labour comes into this type of stock husbandry, as well as into tobacco growing. On one property I saw Sussex steers 22 months old which had put on 350 pounds in 80 days, fed on silage and hay plus urea. Corn cobs with urea were also used for cattle food.

AGRICULTURAL RESEARCH STATIONS

The work of the Henderson Research Station, Salisbury, and the Grasslands Research Station at Marandellas, should be of interest to those concerned with agriculture in Australia's summer rainfall areas. Henderson is in the main maize-growing area and is aiming to work out farming systems combining crops, stock and pastures to improve on the present tendency to specialise towards maize, tobacco or livestock. I made only a brief
visit, but the Annual Report of the Station, of which I have a copy for 1953, gives more details.

Grasslands Research Station at Marandellas is in sand veld 5,500 feet above sea level, and has as much as 18 degrees of frost in winter. With 35 inch summer rainfall on the sandy surfaced soil, contour banks are necessary to prevent erosion on slopes as low as 2½ per cent.

The work at Grasslands is largely directed towards improving the grazing capacity of the land by clearing, and introducing better grasses and legumes. Dr. Oliver West, who visited Australia a few years ago, is in charge. Star grass pasture has given 503 gallons of milk per acre from Friesian cows milked in portable bails. The winter feed was supplemented with silage (18 tons per acre) made from the same area during the summer.

Katambora Rhodes grass from the Zambesi has done better than Australian Rhodes grass. Work is going on with three strains of Cenchrus ciliaris (African foxtail), and a seeding strain of Panicum coloratum. As legume components for better and more balanced grazing, dahl or pigeon pea, (Cajanus cajan) and Leucaena glauca are under trial. The latter grows to 6ft. and is very palatable. The tall-growing pigeon pea has been tried in a double row, separated from the next double row by a 15ft. space planted with Rhodes grass.

Irrigated winter pastures are under trial. There are also trials in depressions which remain moist in the dry winter, but severe frosts are a handicap.

The development of meat sheep by intercrossing Black Head Persian, Dorset and German Merino is in progress.

SOIL CONSERVATION AND EXTENSION

Conservation of natural resources, especially soils, water and forests receives considerable emphasis both on European and native areas.

The most striking feature of the Southern Rhodesian efforts is the ratio of professional conservation staff to the number of farmers. Under the Natural Resources Act, farmers in an area may petition for the declaration of an Intensive Conservation Area. At August 1, 1954, 85 I.C.A.'s were declared and a few more are expected. This means about 60 farms per I.C.A. It is hoped to provide a Conservation Officer—usually a University graduate—to serve each Intensive Conservation Area. Conservation Officers now total 77.
Their efforts are supported by 13 Group Conservation Officers and 17 Extension Officers. The total staff of the Department of Conservation and Extension is listed in the Annual Report to 30 September, 1953, as 146, of whom 123 are professional and technical officers. The expenditure on this Department in 1952-53 was £A455,000 which represents around £A90 per farmer. This Department deals with European farmers only. Agricultural research and other services are not included in its budget. The Native Department deals with native land husbandry on the 25,000,000 acres set aside exclusively for natives.

Every official envelope in Southern Rhodesia has printed at its base “The soil is our greatest asset: help to conserve it.” Conservation efforts have included a very widespread use of contour practices, especially contour banks (called contour ridges in Southern Rhodesia). In 1952-53, 98,964 acres were so treated, while since 1929, 838,080 acres have been protected with 46,560 miles of contour ridges and related earthworks. Travelling by air in Southern Rhodesia the contour lines on European farms, and native areas too, have an intensity not seen anywhere in Australia.

One wonders whether the approach to soil conservation has placed too great emphasis on contour earthworks. I was unable during my short visit to judge the severity of the past erosion problems. A Commission headed by Mr. Justice McIlwaine had reported in 1939 that drastic action was necessary to check soil erosion and wastage of other natural resources. As soon as possible erosion control efforts were greatly intensified. It must be remembered too, that this is a summer rainfall area more like northern New South Wales and Queensland than Victoria, South Australia and the agricultural areas of Western Australia. Emphasis in Southern Rhodesia, as in South Africa, is now turning more to the biological rather than mechanical aspects of soil conservation. The 1952-53 Annual Report of the Department of Conservation has this short but very significant passage (p. 15).

(ii) Other Conservation Measures.

It is accepted that a permanent soil cover is the most effective conservation measure against erosion. Because of this it is most encouraging to report an increased interest in grass as a crop in arable rotations.

General advisory services to farmers on aspects other than soil erosion control are being intensified.
SUBSIDIES AND FARM PLANNING

The cost of conservation works such as dams and contour earthworks is subsidised in Southern Rhodesia as follows:

50% in under 25in. rainfall areas.
33\(\frac{1}{3}\)% in over 25in. rainfall areas.

The Intensive Conservation Area Committee is also given an amount equal to one ninth of the cost of such works in its area. In 1952-53, I.C.A. Committees received Grants-in-Aid from this and other sources of £A33,000. Subsidies to individuals were £A72,000.

The payment of subsidies is not based on approved farm plans as in South Africa. However, farm planning has been commenced by the Conservation Department as a logical step to encourage more rational use of soil resources. Southern and Northern Rhodesia have been conferring about suitable methods, including consideration of whole catchment areas rather than individual farms.

The scale of expenditure of public funds on soil conservation and related services seems very high by comparison with Australia. But I was informed that Southern Rhodesia was some years ago paying £3,000,000 sterling per year in subsidising food imports. Efforts to protect the soil and improve production therefore assumed great importance.

NORTHERN RHODESIA

Across the Zambesi River from Southern Rhodesia lies Northern Rhodesia, 850 miles long and 450 miles across in its widest part (see map Plate 3). It has a narrow waist about 100 miles wide where a tongue of Belgian Congo comes in from the north-west. This locality is the great Copper Belt area of Northern Rhodesia and Belgian Congo, along the watershed of streams draining north to the Congo River and south to the Zambesi.

European settlement and farming are mainly along the “line of rail”—the railway from Livingstone near Victoria Falls, north-east to Lusaka, the capital, and north to N'Dola and other Copper Belt towns. There are only 1,200 white farmers, for Northern Rhodesia is mainly a native territory (50,000 Europeans, 1,600,000 natives). It has been administered by the British Colonial Office, and so has Nyasaland to its east, but a Federation of Southern Rhodesia, Northern Rhodesia and Nyasaland was set up in 1953 and administrative changes are in progress.
a GIANT of a chain saw
.. in a ONE-MAN package

When you receive your Mobilco in its sturdy carton with fuel tin, oil measure, high quality tool kit and guarantee card, it’s a good enough sight and it spells quality all the way through . . . But it is not until you take this mighty little monster and press the chain deep into a hardwood log that you realise what a good machine you have got. There is light weight here and full genuine five horsepower performance . . . enough to keep a man going day after day, year after year, turning timber into profit at a minimum of toil and sweat. Write for all the details now. They will be posted to you right away.

Mobilco
ONE-MAN
CHAIN SAW

QUICK SERVICE COUPON
Please send me straight away and without obligation all details of the Mobilco chain saw.
Name ...........................................................
Address ...........................................................

MOBILE INDUSTRIAL EQUIPMENT LTD.
293 MAY STREET, EAST PERTH
HEAD OFFICE: 410-422 WHITEHORSE RD., MITCHAM, VIC.
PHONE: BF 2971 and BF 2617
BRANCHES: SYDNEY, ADELAIDE, BRISBANE
AGENTS: LAUNCESTON AND HOBART.

You can get your Mobilco on terms. A reasonable deposit and monthly payments well within your reach will start earning money and saving effort for you right away. There’s the coupon at the left. Fill it in and post it for full details on the Mobilco.

Please mention the "Journal of Agriculture, W.A." when writing to advertisers.
"The Boss just can't afford to be without 'THE CHRONICLE'
every week. Nor can the lady of the House. It's chockful of good things for both of them."

And the dogs are right. There's no better weekly paper for country people in Australia than "The Chronicle." Take a look at these weekly features, written by specialists in their spheres to guide, help and entertain men and women who are specialists in theirs'.

FOR COUNTRY MEN—
Sections on dairying, sheep, poultry, orchard and vineyard, machinery on the farm, animal health, what the farmer wants to know (service section), wool and stock market reports, feature articles, lawyer's advice on country problems.

FOR COUNTRY WOMEN—
Reader-tested recipes which all the family will like, patterns, garden notes, interior decoration, chatty letters, personal diaries, pages and pages of pictures of people and places in the news, advice by a Mothers' and Babies' Health Association matron, doctor's answers to queries. That's a good 6d. worth, isn't it? And "The Chronicle" is a rarity today—its price is the same as it was before the war.

You'll get more from your farm—and put more into your farmhouse—with the help of "The Chronicle."

The subscription rates are 7s. 6d. for three months, 15s. for six, or 30s. for a year. If you would like it regularly—and you don't get the best from it unless you do—fill in this form and send it to the Circulation Manager, Box 392, G.P.O., Adelaide.

Please send me "The Chronicle" for ................. months.

A cheque, postal note, postal order for ................. is enclosed.

Name (Mr., Mrs. or Miss) ..................................................

Address ........................................................................

Please mention the "Journal of Agriculture, W.A.,” when writing to advertisers
My guide and main source of information during five days in Northern Rhodesia was Mr. J. Neil Clothier, Chief Conservation Officer of the Department of Agriculture. I had short discussions also with C. W. Lynn, M.B.E., Director of Agriculture and M. Halcrow, O.B.E., Deputy Director. Their department, through various officers, gave me a broad picture of conservation work, agricultural development and problems.

Most of Northern Rhodesia is 3,000 to 5,000 feet above sea level, so that although it lies in the latitudes of Wyndham, Darwin and the far north of Queensland, temperatures are much lower than in those parts of Australia. The climate offers a dry bracing winter, summer rains, and temperatures not too high for the comfort of Europeans.

The Department of Agriculture in Northern Rhodesia deals with both European and native agriculture. As already pointed out, similar Departments in South Africa and Southern Rhodesia are restricted to European farming. Tobacco, maize, cattle for slaughter and dairy produce are important farm products. The supply of perishable foods to the mining population in the Copper Belt and Broken Hill comes mainly from the southern parts of the territory. Whole milk is sent long distances by rail. The problem of providing good quality grazing during the long dry period is similar to that in north Australia; also the problem of suitable pasture legumes. Where the topography is gently undulating, the depressions which are the source of small streams remain moist in winter. These “damboes” are possible places for developing green winter pastures; they correspond to moist “summer land” in winter rainfall areas of southern Australia.

**NATURAL PASTURES AND BUSH ENCROACHMENT**

The savannah and bush veld country of Transvaal and Southern Rhodesia seem to change gradually to woodlands of much lower natural grazing value in the wetter Copper Belt area of Northern Rhodesia and Belgian Congo where the rainfall is 40 to 50 inches. In grazing country, bush encroachment, to the detriment of the useful grasses, is a problem which apparently requires careful use of grazing animals and fire. Fire can apparently hold back bush encroachment, but throughout South Africa and the Rhodesias, veld firing seems a controversial matter. Farmers want to stimulate grass growth before the rainy season commences, but early burning leaves the dangers of erosion when the rains come. It was interesting to note, however, that it was suggested that Northern Rhodesia would have had much more bush and much less grass, if the natives had not regularly used fire in their system of shifting cultivation.
In the vicinity of Chisamba I saw an open thorn savannah with well managed *Hyparrhenia hirta* (thatch grass) grazing, which contrasted with a nearby poorly managed area showing lantana and bush encroachment.

**IMPROVED PASTURES**

In Northern Rhodesia, star grass (*Cynodon* sp.) and *Panicum makarikari* pastures are being developed on tobacco lands and other areas. Velvet bean and sun hemp also show promise. The star grass is not the giant star grass, which because of possible poison properties has been under grave suspicion in Australia, but the Naibasha strain from Kenya (also called No. 2 strain from Southern Rhodesia). One farm I passed near Chisamba milks 200 Friesians for 600 gallons of milk per day, sent to the lead-mining town of Broken Hill. Star grass is the major pasture. At Grasslands Research Station in Southern Rhodesia, Dr. West reported that star grass pasture on sand veld had given 503 gallons of milk per acre per year from a Friesian herd milked in the paddock in portable bails. Silage—18 tons per acre—was made in summer and fed back during the dry, cold winter. At Kambowa Experiment Station, south of N'Dola, Northern Rhodesia, where the 45 inches of rain falls mainly in the December-March period, star grass pasture, planted December 1953, had by July 1954, been strip-grazed twice with an electric fence, and had given very encouraging production. No fertiliser had been used, but superphosphate and nitrogen applications were proposed. Rooted pieces of star grass are planted 3ft. x 3ft. after the land has been cleared and stumped and disc ploughed and disc harrowed.

Gold Coast Napier fodder (elephant grass) at Kambowa was planted in contour rows. It was planted in December with 200 lb. per acre of super in the rows. 200 lb. per acre sulphate of ammonia was applied in late February. Twelve tons per acre green material was cut for silage in May and the aftermath grazed at the end of June. A pit of silage made from maize in the lower part and Napier in the upper part without cutting into small pieces, was of interest. Molasses had been added to the Napier fodder. For each cow half an acre of maize had been cut for silage.

**TOBACCO GROWING**

An interesting day was spent on Mr. R. Burton’s farm at Broken Hill, where
tobacco, maize and cattle are produced. Two links with Australia gave added interest. Mr. Burton’s father went from Australia to South Africa during the Boer War; Mrs. Burton’s attractive garden rockery was made from ironstone lumps (laterite) so familiar to Western Australians as road-making material.

The country is gently undulating in these parts with trees 30ft. to 40ft. high (Brachystegia sp. and Isoberlinia sp., both legumes) and coarse grasses. Cattle can be grazed during the wet season in the bush country, at the rate of a beast to four acres. The soils are grey sands and sandy loams with ironstone gravel and more clay in the subsoil. Ironstone boulders outcrop in places. The soils have a marked resemblance to many of the Western Australian scrub plain soils and are undoubtedly of similar origin. Such soils are relics of a wetter climate in Western Australia, but in Northern Rhodesia with 30 to 40 inches of summer rainfall, dry winter and senile drainage system, such soils are to be expected in granite country.

Clearing for tobacco cost £15 sterling per acre. Using a D8 bulldozer at £5 13s. per hour, bulldozing costs are £6 sterling per acre. Cordwood for the tobacco kiln furnaces is cut from the felled trees. Stumping and removing the balance of the trees brings costs up to £15 sterling per acre. Burning the fallen vegetation on the land is avoided as far as possible because irregular distribution of ash causes undesirable variability in tobacco crops. After a first crop of tobacco, millet is grown the next year, then a second tobacco crop in the third year. Older cleared lands are seldom used for tobacco; farms combining tobacco, maize and cattle are 3,000 to 4,000 acres each on this “sand” country. Work on improved pastures for the cleared land is proceeding.

Mr. R. Burton grows 110 acres of tobacco with a native labour force of 80 native “boys.” Two acres of seedbeds provide 6,000 plants per acre in the field. The main varieties are Bonanza, Hicks, Delcrest and White Stem Orinoco. Yields are 800 to 1,000 lb. of leaf per acre. Much of the tobacco grading is done by grading firms for a charge of 4d. per lb. There is little market for medium and poorer grades and there is about 6 per cent. loss in grading. Mr. Burton estimated that 750 lb. per acre should leave the property for economical production. After grading, this leaves 700 lb. which needs to sell for an average of 45 pence sterling to leave 3s. sterling net on the farm. Grading and commission takes about 8d. per lb. Gross
return at these prices would be £105 sterling per acre; production costs are between £70 and £80. Fertiliser application for tobacco ranges from 450 to 900 lb. per acre. Two mixtures are used:—"V" containing 8 per cent. nitrogen, 19.5 per cent. phosphoric oxide (P₂O₅) and 15 per cent. potash (K₂O) and, for topdressing, "E" containing 8 per cent. N and 16 per cent. K₂O. The factory price f.o.r. of these mixtures in 1954 was:—"V" £29 4s., "E" £29 1s. sterling per short ton (2,000 lb.).

SOIL CONSERVATION AND FARM PLANNING
The 1,200 European farmers in Northern Rhodesia are developing about 4,000,000 acres of land. Well-developed schemes are in hand to promote farm planning in the interests of overall soil conservation. Work is going on, too, on the native areas where evidence of soil erosion is common, due to overgrazing and faulty cultivation systems for maize crops, and caused also by sledge trails on slopes. Natives are being encouraged to use two-wheeled ox-carts, costing them about £15 sterling each, for carting produce to their villages, instead of the sledge whose trails can so easily wash into gullies. With a cart subsidy scheme operating, sledge will be forbidden.

The Upper Kaleya region about 80 miles south of Lusaka, the capital, was visited as an example of work on native areas. Here soil conservation officers and agricultural instructors were improving the land use in this area of attractive soils. Almost black soils formed from limestone occur, as well as red and red brown soils on dolerite. The area has about 28 inches summer rainfall. On slopes above 5 per cent., cultivation is not allowed. Storm drains on grades of 1:800 or 1:600 are built at the top of the cultivation lands by shuttle-dozing with a D7 bulldozer at a cost of £7 sterling per 100 yards. Lower down, contour banks with variable grades up to 0.3 per cent. are built with a D7 tractor, ripper and four-wheel drawn grader at 35s. sterling per 100 yards. These are at about 12ft. vertical intervals. Between these banks it is planned to build two more contour banks with a Ferguson tractor and single disc "belly" plough. (The disc is mounted between the front and rear wheels of the tractor.) Stock water dams are built in suitable water courses.

The Department of Agriculture has earthmoving plant costing £400,000 sterling for this and similar work.

Farm planning in areas of European farms is being approached on a catchment area basis. Intensive Conservation Areas mostly coincide with catchment areas. Under the Natural Resources Ordinance, 1950, an Intensive Conservation Committee is set up from among the settlers in each I.C.A. Working with these Committees, the Conservation service of the Department of Agriculture organises its officer and machinery.

In relation to modern agriculture, Northern Rhodesia is virtually a young pioneering country, and is attempting in its conservation approach to adopt prevention instead of cure in matters such as soil erosion. Though there has been a feeling that prevention does not attract as much sympathy or support as plans for
Due to the vision of Richard Goldsborough, in Melbourne, over 100 years ago, the wool auction system of Australia commenced. In 1843 Thomas Sutcliffe Mort started the first continuous series of wool auctions in Sydney. Later a partnership was formed and the foundation of the vast wool-brokering organisation of Goldsborough Mort & Co. Ltd., which has endured and flourished for over a century, was firmly laid.
Here's the inside story of AUSTRALIA'S GREATEST MEDIUM-HEAVY TRACTOR

The 745 Diesel is the tractor with that extra lugging power you often need... reserve power for tough spots and conditions. Economical power, too, because 745 Diesel is specifically designed to give power advantages for every demand.

Cold starting easy: Electric starter, fuel primer and electric manifold heater make starting easy and quick on diesel fuel — on the job quicker!

Power-saving straight-line Transmission: Straight spur gears, 3-stage speed reduction and oil-bath lubrication make the straight-line transmission power-saving and trouble-free.

Many Extra 745 Diesel Advantages:
- Shorter turning radius
- High-arch front axle
- Easy handling
- Full length cast frame preserves alignment
- Twin power control — higher transport and belt speeds with same economy
- All cylinders have replaceable wet sleeves
- Velvet-ride seat with variable rate coil spring and hydraulic cushioning
- Borg and Beck 16-spring clutch
- Three fuel filters
- Heavy-duty brakes
- 3-point linkage and Sundraulic lift.

Ask your local agent for demonstration or write direct to:

H. V. McKay Massey Harris Pty. Ltd.
Maylands, Western Australia

Manufacturers of farm-tested, quality-proven machinery for over 70 years.

---

Full 40 h.p. on the drawbar
More power
Longer life
Greater fuel economy
New reduced price from £1,396

55 DIESEL TRACTOR
382 cubic inches of full diesel power makes the 55D the tractor with the greatest lugging ability at the lowest cost per horsepower. Three fuel filters ensure clean running. 54.5 drawbar h.p.
Price from £2,140

55K TRACTOR
This is the powerful kerosene tractor for the biggest farms using the biggest implements. Has rotating exhaust valves for long life and least maintenance. 49.5 drawbar h.p., and greatest economy operation.
New Reduced price from £1,525.

44K SPECIAL TRACTOR
The 44K brings new high performance, new economy, new comfort, new handling ease; it has rotating exhaust valves for longer life and less maintenance. ALSO now available with the NEW HITCH-ALL 3-point linkage. New Reduced Price from £1,284/12/6.

Please mention the "Journal of Agriculture, W.A.," when writing to advertisers.

Journal of agriculture Vol. 6 1957
curing damage, yet a vigorous and financially supported programme is now going ahead. As already stated, earthmoving plant costing £400,000 sterling is in operation for carrying out the required mechanical works of the programme. The aim is to plan and do the necessary works on 100,000 to 150,000 acres of farms per year. The annual cost of a service for this is estimated at £45,000 sterling embracing planning, direction of works and extension work.

The Government has agreed to provide £50,000 sterling per year for subsidies for approved conservation works, and £100,000 sterling per year for 25-year loans at 4½ per cent. interest to help farmers carry out the plans. Some works of community benefit will get 100 per cent. subsidy up to 2s. 6d. per acre of a property. Others will get 50 per cent. subsidy up to 3s. 9d. per acre. The remaining 50 per cent. may, if necessary be met from the 25-year loan money. (More details of these plans and their application to catchments and individual farms are in my possession.)

To complete the picture, some statistics of food production and imports are hereunder quoted from a paper written in July 1953, by J. Neil Clothier, "Soil and Water Conservation in Northern Rhodesia."

### European Agricultural Production Figures

<table>
<thead>
<tr>
<th>Crop</th>
<th>1938</th>
<th>1949</th>
<th>1950</th>
<th>1951</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize (bgs)</td>
<td>206,024</td>
<td>370,500</td>
<td>477,000</td>
<td>599,450</td>
</tr>
<tr>
<td>Wheat (bgs)</td>
<td>4,529</td>
<td>1,500</td>
<td>3,500</td>
<td>840</td>
</tr>
<tr>
<td>Milk (gallons)</td>
<td>There has been a growing industry</td>
<td>700,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Butter (lb.)</td>
<td></td>
<td></td>
<td></td>
<td>19,782</td>
</tr>
</tbody>
</table>

Cattle owned by Europeans (head) 125,447... 135,605 127,387

Other stock is negligible.

1951—Food Imports that Might be Locally Produced

<table>
<thead>
<tr>
<th>Crop</th>
<th>149,763</th>
<th>1,755,112</th>
<th>1,007,290</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maize (bgs)</td>
<td>149,763</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
<tr>
<td>Wheat (bgs)</td>
<td>180,218</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
<tr>
<td>Slaughter Cattle (head)</td>
<td>44,060</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
<tr>
<td>Sheep (head)</td>
<td>7,709</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
<tr>
<td>Pigs (head)</td>
<td>2,188</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
<tr>
<td>Bacon and Ham (lb.)</td>
<td>426,946</td>
<td>1,755,112</td>
<td>1,007,290</td>
</tr>
</tbody>
</table>

The conservation programmes of South Africa, Basutoland, Southern Rhodesia and Northern Rhodesia lead me to conclude that food imports, soil erosion and grassland deterioration on native and European areas, have together developed an urgency about conservation, and a positive approach, which is still largely lacking in Australia. Though all Australian States and Commonwealth Territories are interested in soil conservation and soil erosion and have services of various types and sizes, we have evidently not yet felt the same urgency about a conservation objective, nor the need to plan for it and to support the plans with adequate public funds. And this situation exists in spite of the fact that primary produce from the soil is Australia's major source of wealth.

### Belgian Congo

Belgian Congo occupies the heart of Africa and embraces much of the basin of the mighty Congo River. Yet it may come as a surprise to know that it is nearly as large as Western Australia, and thus equals about one third of Australia or the United States of America. It extends 350 miles north of the Equator and 900 miles south (see map Plate 4). From its small Atlantic seaboard at the mouth of the Congo, it goes east nearly 1,300 miles to Lake Tanganyika. The annual flow of the Congo River is about twice that of the Mississippi, and is exceeded only by the Amazon.

Unlike South Africa and the Rhodesias, which are mainly 2,000 to 5,000 feet elevation, Belgian Congo is mainly 1,000 to 2,000 feet. Its southern and eastern parts go higher approaching the Congo-Zambesi watershed (over 4,000 feet), and the mountains forming the western wall of the Great Rift Valley of Africa. In the Rift are Lake Albert, Lake Edward, Lake Kivu and Lake Tanganyika (this lake is 400 miles long). Ruwenzori, near the Equator between Lake Albert and Lake Edward rises to 16,795 feet.

Ruwanda Urundi is a small Belgian Territory east of Lake Kivu and Lake Tanganyika, between Belgian Congo and Tanganyika.

The course of the Congo River was first traced by Stanley in 1875-77, and he returned in 1879 to found a settlement. For
BELGIAN CONGO
Showing Route Followed & Centres Visited
August 1954

SCALE - MILES
Plate 4

Journal of agriculture Vol. 6 1957
a long time the territory belonged to King Leopold II of Belgium personally, but since 1910 has been a Belgian colony. It is a territory of great natural wealth which the Belgians are now rapidly developing, with considerable emphasis on native education and industry. Exports have nearly doubled since 1945. Exports from mining make up 60 per cent. of the total value, and approach £A90 million. Agricultural exports account for most of the remaining 40 per cent., or £A60 million. Thus agricultural exports are of similar value to those of Western Australia.

Palm oil and palm nuts, cotton, and coffee are the major agricultural exports. Other important products much of which are consumed by the 13,000,000 native inhabitants are:

<table>
<thead>
<tr>
<th>Product</th>
<th>Tons.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manioc (from cassava)</td>
<td>6,700,000</td>
</tr>
<tr>
<td>Maize</td>
<td>323,000</td>
</tr>
<tr>
<td>Peanuts</td>
<td>180,000</td>
</tr>
<tr>
<td>Bananas and plantains</td>
<td>1,800,000</td>
</tr>
<tr>
<td>Rice</td>
<td>176,000</td>
</tr>
<tr>
<td>Sweet potatoes</td>
<td>300,000</td>
</tr>
</tbody>
</table>

Manioc the carbohydrate from the swollen tuber of cassava is the main native food. It is from manioc that tapioca is made.

The mineral wealth of Belgian Congo comes from copper, cobalt, uranium and industrial diamonds. In the mining areas centred on Elisabethville and Jadotville in the south-east near Northern Rhodesia, the Soil Congress delegates were entertained for a day by Union Miniere de Haut Katanga, the controlling organisation for mining in that region. We were shown over a refinery producing electrolytically 300 tons of pure copper per day. Fifteen tons of cobalt per day is also produced—we were told this is three-quarters of the world production, and is valued at nearly £A1 per pound. A large proportion of the world’s industrial diamonds comes from Belgian Congo.

**RESEARCH AND ADVISORY SERVICES IN AGRICULTURE**

The greatest surprise awaiting an overseas agriculturist visiting Belgian Congo is the vast scale of agricultural research and services. Before I left Australia I had read of I.N.E.A.C.—the agricultural research organisation of Congo. I knew it had a research station at Yangambi, on the Congo River in the heart of Africa. But I certainly did not expect to find 80 European scientists, a total European staff of 150, and 2,000 native employees on this station in such a seemingly remote locality.

After Congo became a Belgian Colony in 1910 its Director General of Agriculture, Professor Leplae, saw the need for experiment stations, visits of experts from other countries, and publications to spread...
knowledge of data acquired. Progress was made, but, as in most countries, received a severe check in the depression of 1930. Evidently about this time the need for even more scientific research was appreciated by Prince Leopold, and in 1933, I.N.E.A.C. (l'Institut National l'Etude Agronomique du Congo Belge) was established. It now has a budget of over £A2,000,000 annually for its research and related activities in agriculture and forestry. A further £A6,000,000 is devoted to general agricultural services. A European staff of 700 is assisted by 7,000 native assistants. Of these natives, about 1,000 have training and diplomas in some aspects of agriculture, forestry or veterinary work.

I had no opportunity to see the workings of the agricultural extension services at first hand, as our time in Belgian Congo was almost fully occupied with the Soil Science Congress and its related excursions. The nature and extent of the services were brought to our notice through a display of publications and statistics at the Congress and in a publication "Agriculture Congolaise," 1954.*

Incidentally, one of the first publications to catch my eye was a book of several hundred pages on Australian Eucalypts. Agricultural systems of a native people in a tropical climate are, of course, vastly different from Australian agriculture. But the great importance attached to agricultural research and advisory services in what we sometimes still term "darkest Africa" is most noteworthy. Fig. 18 shows the agricultural advisory service booth at a display of native arts and crafts arranged for us in the Botanic Gardens at Leopoldville, capital of Belgian Congo, where the main sessions were held.

**LE PAYSANAT**

Literally translated this term means "the peasants and their lands." The Belgians have important plans for developing and improving all aspects of the rural economy of the native people. They encourage the native tribes to farm their lands systematically, to use better adapted higher yielding varieties of crops, to control pests and diseases, and to adopt some mechanisation. The growth of crops for sale for cash, like cotton, oil palm and coffee, in suitable localities, is encouraged.

Better housing, schools, hospitals, water supplies, marketing co-operatives are all part of the scheme. Also fish culture wherever possible, to improve the protein diet of the natives. All this is done after the co-operation of the native chiefs has been assured. It is supported by the various native and European staff giving agricultural and veterinary advice, as outlined earlier.

**SHIFTING CULTIVATION AND FOREST FALLOW**

How to maintain the fertility and productivity of land is a basic feature of the art and science of agriculture. African natives have done it for a long time by shifting cultivation. The forest is cut down and burned, and amongst the stumps and ashes, crops are grown for a few years till yields become very low. Then the area is abandoned and forest regrowth occurs. After 12 or 15 years it can be cut down again and more crops planted, for the deep-rooted trees have gathered into their leaves and branches and wood essential plant needs, which become available for other crops when the trees are cut and burned, or left to rot. A fallow period is one in which no crop is grown, and the treatment of the land is aimed at restoring or building up fertility. In Australia we are accustomed to the practice of bare fallow (or trashy fallow on soils liable to erosion.) The African native uses forest fallow. The secondary forest may grow 50 to 60 feet high in the fallow period under this system near the Equator. Secondary forest at Yangambi 80 miles north of the Equator is shown in Fig. 25. It represents 10 years growth of the very softwooded umbrella tree. The rainfall is 73 inches per annum, with a period in January and February somewhat drier than at other times. Mean monthly temperatures are very uniform throughout the year — maximum 85° F., minimum 68° F.

---

The general sequence of operations and crops is shown in the following outline:

**Forest Fallow—Cropping—Yangambi, Belgian Congo.**

1 are—1/100 hectares; 50 are—1.2 acres.

The Turumbu Paysannat at Yangambi is based on 50 ares—1.2 acres of crops per family.

December. Cut bush.

1st Year—
January, February. Short dry season for burning.
March. First crop—maize.
July. Harvest maize.
August. Plant bananas, rice and pineapples and cassava (manioc).

2nd Year—
January. Harvest rice.
September. Commence harvesting bananas, harvest manioc and cut back.
October, November, December. Regrowth manioc.

3rd Year—
January, February, March to December. Harvest manioc and bananas.

4th Year—
March. Plant maize.
July. Harvest maize.
September, October. Plant peanuts on half area (25 ares—not acres).
November.
December. Harvest peanuts.
Bush fallow. 13-15 years.

At Yangambi, the upland soils are mainly sandy. They are derived from wind-blown desert sands deposited here during a very dry climatic era in lower Pleistocene times.

The Belgian agricultural scientists are studying ways and means of improving the efficiency of this system. They are encouraging the natives to open up the forests in corridors and on a regular cycle. They are working in the Food Crops Department at Yangambi to breed higher-yielding varieties of maize and peanuts and rice. There are also experiments in mechanical clearing of forest and the use of tractor-drawn ploughs on completely cleared areas. Usually the natives plant by hand in among the stumps and logs. They also have bananas, pineapples and rice planted haphazardly for the same reason.

It seems surprising at first that the use of fertilisers to maintain or improve fertility, instead of the forest fallow, does not receive more attention. But this is an endeavour to improve native agriculture, and natives have too little cash income yet to buy expensive mineral fertilisers. Improved varieties by plant breeding offer much greater scope.

The Food Crops Department of the I.N.E.A.C. Station at Yangambi has 500 varieties of rice (upland varieties about 100), 220 varieties of peanuts, and 200 varieties of maize. It should not be overlooked by workers interested in these crops for northern Australia and New Guinea.

**TROPICAL AGRICULTURE—OIL PALM, COFFEE, COCOA, RUBBER**

Yangambi, which we reached by an 80-mile river boat trip from Stanleyville, the nearest airport, is the main research station of I.N.E.A.C., but there are 31 others of different orders throughout this vast territory. Three others were visited: —In the Lower Congo, Mvuazi and Gimbi, and in the Katanga area, Keyburg (Elisabethville). The Colonial Agricultural Department also has 40 stations at which selected material is tested, and where suitable systems for local conditions and native agriculture are studied.

At Yangambi much attention is devoted to the plantation crops, oil palm, coffee, cocoa and rubber, as well as food crops, cattle and pigs. The results may be of value in relation to New Guinea. The nutrient requirements of these crops are receiving intensive study by Professor M. V. Homes and his co-workers. Their findings are in the publications of I.N.E.A.C.* The glass house and other experimental facilities at Yangambi for such work are on an elaborate scale.

**LOWER CONGO (BAS CONGO)**

The Bas Congo is the country extending inland 200-300 miles from the Congo River mouth. From Leopoldville, the capital, beside the Stanley Pool, the river drops 800 feet in about 200 miles over a

---

series of rapids. There is a railway from Leopoldville to Matadi, the port for ocean ships, and this carries goods brought down the Congo and tributaries by river boats. The Congo is navigable for 1,000 miles upstream from Leopoldville to Stanleyville (see map Plate 4). The boats have a draught up to ten feet. Previously the stern paddle wheel type was used. Some of the earlier boats were brought from the Mississippi, but the latest craft are diesel-powered propeller types, and can do the 1,000 mile journey in four to five days. Shipbuilding is one of Leopoldville's industries.

Timber and bananas are important export products derived from the lower Congo area. It was interesting to see something of the forestry—banana programme in the Gimbi region. Here on steep slopes bananas are grown for several years in State forests to help the regeneration of the limba tree (Terminalia superba), on cut-over areas. The banana (Gros Michel variety) provides production for food and export and a nurse crop for the limba seedlings. On some areas of fertile soils (red latosols) cocoa may later be introduced under the shade of the developing forest.

Other products of the lower Congo, either for food or export, are manioc, rice, maize, peanuts, beans fibres (sisal) and palm oil. Cattle are also kept.

This area is about 5 degrees south of the Equator and has a rainfall of 50 to 55 inches, with a definite dry season from May to September.* Although temperatures are fairly high, cloudiness is common in the dry season, due to the movement inland of air from the Atlantic, and this lessens the severity of the dry season.

The M'Vuazi Station of I.N.E.A.C., is concerned with problems of utilisation of the M'Vuazi-Kokozi Forest Reserve which has scattered patches of forest as well as grass and savannah areas. The vegetation and soils have received close study. Some work with breeds of cattle is included. The research station at Gimbi works mainly on food and fibre crops especially sisal (Agave sisalana) and Urena lobata. The plateau soils here are mainly red and yellow clays, but a very interesting feature to Australians is the occurrence of large amounts of laterite (ironstone) in various places.† The use of lime, as well as fertilisers containing nitrogen, phosphorus, and potassium has given a tenfold increase with sisal compared with plantings receiving none of these additions.

**HIGH KATANGA (HAUT KATANGA)**

The Haut Katanga area 700-800 miles south of the Equator and the adjacent areas of Northern Rhodesia are in the

* The climate belongs to the Köppen Aw type.
† See Waegemans G. The laterites of Gimbi, I.N.E.A.C. Scientific Series No. 60, 1954.
Why wait? You can start earning bigger profits NOW

With the Modern
BARROW LINTON
Clover Harvester

Buy on our Easy Terms and start it working for you on this Season's Crop.

Now is the time to start earning bigger profits in clover seed harvesting. The revolutionary Barrow Linton Harvester cuts clover gathering costs to about one-fifth of previous methods because it gathers, threshes, screens, and conveys the seed to a bagging bin in one operation—at the rate of up to six bags per hour. Inquire about Barrow Linton's easy terms and start making bigger money on this season's crop. A few machines available for immediate delivery.
the bigger, more beautiful
world-famous kerosene
£167/10/-

Electrolux world-famous for service . . . efficiency and economy. When you buy Electrolux you buy lifetime refrigeration—that's why today thousands of Electrolux models are still in perfect working condition, after 30 years' faithful service. See the bigger size—bigger value kerosene Electrolux model LT731 now at your nearest dealer. 7½ cu. ft. £167/10/-. Other Electrolux models available—
LT314—3.3 cu. ft. kerosene or electric, £105. LT171—1.7 cu. ft. kerosene or electric, £75.

Prices slightly higher in country areas.

DISTRIBUTORS:

Dalgety AND COMPANY LIMITED
INcorporated in Knotofoun

ELECTROLUX REFRIGERATORS ARE AVAILABLE FROM DALGETYS OR THEIR LOCAL DEALER IN YOUR DISTRICT

Please mention the "Journal of Agriculture, W.A." when writing to advertisers
At Yangambi, in the heart of Africa, is a large agricultural and forestry research centre. Here are seen cocoa experiments. The cocoa plants are in concrete cylinders with umbrella trees grown to provide shade in the same latitudes as Wyndham, Darwin, and Cape York Peninsula. Likewise, these areas have a five months rainy season in summer, and seven months almost rainless. The winter is, however, much cooler by day and colder by night than north Australia because this inland area is about 4,000 feet elevation. Congo River tributaries drain north from it, and Zambesi tributaries go south. Winter frosts are common. The annual rainfall is about 50 inches.

Belgian Congo and Northern Rhodesia are both interested in developing agriculture in this environment for there are large populations of Europeans, as well as natives, associated with the great mining operations of the region. Living costs, with imported goods, are very high. Some aspects of the work of the Kambowa Experiment Station near N'Dola, Northern Rhodesia, have been mentioned. Work in Belgian Congo is centred on the I.N.E.A.C. Keyburg Experiment Station at Elisabethville.

Tropical fruits fail because of frost. Citrus can be grown, but while lemons and mandarins are good, the quality of oranges and grapefruit has been unsatisfactory. Research on fertilisers and irrigation are in progress.

Temperate fruits show physiological disorders. “Rome Beauty” apples and Chinese peach trees show some promise, however.

Strawberries (St. John variety) do well, also melons (musk and cantaloupe varieties), and potatoes.

Friesian cattle are kept at the Station in studying pastures, fodders and milk production. The production of hay and silage is necessary to tide over the long dry season, although a limited amount of irrigation is possible. Lucerne, velvet beans, and soya beans are under trial. Maize and elephant grass give good yields. With fertiliser, maize has given about 15 tons of green material per acre—10 tons without fertiliser. Elephant grass over a two-year period has yielded about 100 tons per acre in four cuts. Sweet potatoes have been found useful for milk production, using both tops and tubers.

The most promising pasture species so far are:

- Panicum coloratum.
- Panicum maximum.
- Panicum kavirondo.
- Digitaria umfolozi.
- Digitaria tsotsoronga.
- Melinis minutiflora.
- Cynodon dactylon geant (Star Grass).
- Paspalum dilatatum.

The use of star grass in Belgian Congo, Northern and Southern Rhodesia suggests
that this grass may warrant more consideration in the summer rainfall parts of Australia.*

**LATERITE IS OF COMMON OCCURRENCE**

The soils of the High Katanga, and the adjacent Copper Belt area of Northern Rhodesia, have a special interest for Australian soil workers because of the common occurrence of laterite and related features. The country forms the Congo-Zambesi watershed and by natural erosion has been formed into a gently undulating peneplain with senile drainage lines. The geology is complex, including limestones, dolomites, shales, conglomerates and other rocks. There have been climatic changes in the area in past ages. The combination of rocks, climate, topography and time has given soils which include:

(a) At high levels on almost flat situations a laterite crust remarkably like Western Australian laterite.

Beneath is grey and red mottled clay from shale. This laterite is thought to be a relic of an earlier climatic era.

(b) Red and yellow latesols. These are soils with little colour change from the surface to 4ft. or 5ft. Ironstone gravel occurs at considerable depth and the soils are well drained.

(c) Grey soils of variable surface texture and mottled sandy clay subsoils, occurring under imperfect drainage conditions around the source of defined streams and drainage lines. Ironstone gravel and lumps occur in these soils and are sometimes found on the surface, probably due to natural erosion.

The soils in which ironstone gravel and lumps are common in the upper few feet of the profile appear most subject to wet season waterlogging. Some, as mentioned above, are at high level, and may belong to a much earlier climatic period.

---

*I have recently been informed that some Queensland workers are making further trials of star grass. (Personal communication from J. E. Ladewig, Queensland Department of Agriculture and Stock.)

**SOIL EROSION**

Soil erosion was not an important problem in the areas I visited in the Belgian Congo. From the train some small landslides and gully erosion were seen in hilly country between Leopoldville and Matadi.

---

The eastern borders of Congo are more mountainous and steep slopes are cultivated. Here an antierosion organisation (M.A.E.—La Mission Anti-erosive) gives special attention to the prevention and cure of soil erosion. Reafforestation is undertaken as well as contour earthworks. The earthmoving plant available is also used for dams and irrigation and drainage work. In these areas suitable practices to avoid erosion are embodied in plans for improving native agriculture.

THE FIFTH INTERNATIONAL CONGRESS OF SOIL SCIENCE

The Fifth International Congress of Soil Science was the focal point of my visit to Africa. Two hundred soil scientists from all over the world met to discuss soils in formal meetings, at informal gatherings and on field excursions. The papers presented have now been published in four Volumes of Transactions. In many cases soils were being considered as soils—natural objects subject to scientific study merely as natural objects. In other sessions soils were considered as a medium for plant growth, and thus a food-producing medium for the world’s increasing population.

Our Belgian hosts had organised most thoroughly, both for the formal sessions at Leopoldville and for the three excursions to the widely separated Bas Congo, Yangambi and Haut Katanga. Only because of the good internal air services was it possible to cope with all this in three weeks, in such a vast territory. Accommodation problems for the large numbers were overcome by using an ocean going ship in the port of Matadi, and a river boat with passenger cabins at Yangambi. To visit Jadotville, a mining centre 100 miles from Elisabethville, the Congress delegates travelled and slept and dined on a new train built for use on the long railway trips going north-west and west from these areas.

With quiet pride the Belgians gave us every possible opportunity to see the way they are developing this vast territory through mining, agriculture and industry. Hydro-electric power is important. The use of the natives, and the parallel efforts to improve conditions for the natives were of great interest and commanded respect. The work in native agriculture has been mentioned. A million Congo native children receive schooling. Natives drive the trains and operate lathes and similar machinery in engineering workshops of the mines. A display of
native arts and crafts and native dancing in the Botanic Gardens at Leopoldville was of absorbing interest, as was a visit to Leopoldville's native market.

ACKNOWLEDGMENTS

Travel expenses for my visit to Africa were made available from Commonwealth Extension Grant funds. I am grateful to the Commonwealth Minister for Commerce and Agriculture for approval for this use of these funds, and to the Western Australian Minister for Agriculture and Director of Agriculture for permission to make the trip.

Soil conservation and other Department of Agriculture officials in South Africa, Basutoland, Southern Rhodesia and Northern Rhodesia extended the utmost co-operation and assistance in organising for me to visit appropriate centres, in making available their local knowledge and in arranging transport and accommodation. Thanks are extended to all and in particular to:

Dr. P. D. Henning, Director of Soil Conservation and Extension, South Africa.
Mr. L. J. Henning, Division of Soil Conservation and Extension, Pretoria, South Africa.
Mr. L. H. Collett, M.B.E., Soil Conservation Officer, Basutoland.
Mr. C. A. Murray, Director of Soil Conservation and Extension, Southern Rhodesia.
Mr. J. Neil Clothier, Chief Conservation Officer, Northern Rhodesia.

In the Belgian Congo all arrangements were handled by the organisers of the Fifth International Congress of Soil Science. Their efforts, in conjunction with other Belgian officials and officers of I.N.E.A.C., deserve the warmest praise.
These products are obtainable from Shell Chemical (Aust.) Pty. Ltd. agents, and from Fruitgrowers and Agricultural Organisations throughout the country.

Dig out the SHELL horticultural or agricultural products that best cater for your needs, and use them to rake in more profits from your property... Contact your Shell Chemical Agent or Distributor for full details and supplies.

SHELL WHITESPRAY
SHELL SUPERIOR DORMANT OIL
SHELL PALESPRAY
SHELL REDSPRAY
SHELL D.D.T. EMULSION 25%
SHELL ALDRIN CONCENTRATE (40%)
SHELL DIELDRIN CONCENTRATE (15%)
SHELLICIDE “D”
SHELL UNIVERSAL DNC WINTERSPRAY
SHELL APHIS SPRAY
SHELL SOIL FUMIGANT EDB (12½)
SHELL THIRAM 80
SHELLESTONE
GRAFTING MASTIC “H”
GRAFTING MASTIC “L”
COLGRAFT
SHELL T.D.E. EMULSION 20%
SHELL ZIRAM 50
SHELLAMITE 50
SHELL WEEDKILLERS

Shell Chemical
(Australia) Pty. Ltd. (Inc. in Victoria)
Melbourne - Sydney - Brisbane - Perth - Adelaide - Hobart

Please mention the "Journal of Agriculture, W.A.,” when writing to advertisers
Chemists to the Farmers Since 1886

A LINIA BELT for the TRACTOR DRIVER

IDEAL FOR STOMACH SUPPORT

Don't be afraid of exhausting and long hours of work at the tractor. It is now possible, with the aid of the Linia Belt, to retain that fine braced feeling of fitness all the time.

FOR ALL WALKS OF LIFE THE LINIA IS SUCCESSFUL.

Evolved by medical men and therefore anatomically correct in design, the Linia Belt is easily placed in position. Fits every curve of the body. Arrows indicate how the Linia Belt lifts and holds the abdominal organs in their correct position whilst producing a definite reduction in the girth. Also ideal for post-operation wear. Visit us and try the Linia Belt or send for the illustrated "Danger Curve" booklet and order by post. Your remittance will be refunded if you are not entirely satisfied. Millions of men throughout the world enjoy life the Linia way.

Rigiflex HOLDS RUPTURE

9 out of 10 men are NOT SATISFIED WITH TRUSSES!

Even under the most exacting conditions the RIGIFLEX BELT HOLDS and PREVENTS THE SPREAD OF RUPTURE. Pitting like a "second skin" it relieves AT ONCE all pressure from the hernia region; this entirely replaces methods which rely on outside pressure on the rupture tear ONLY. The Rigiflex Belt is made in varying depths according to the special requirements of each person. It is light, porous and easily laundered.

The Rigiflex Method is individual as no two cases are entirely alike. Write today for the interesting and fully illustrated booklet AR.1. "Some things all Hernia sufferers should know."

THE RIGIFLEX BELT

Manufactured and Distributed by Rigiflex Dent., J. ROUSSEL of Paris Pty. Ltd.

COUNTRY ORDERS Returned IN LESS THAN 4 HOURS

YES! Whatever it is—
Medicine, Cosmetics, Photography, Personal Hygiene, Optical, Surgical Belts, or Veterinary Goods.

LINIA and RIGIFLEX BELTS SOLD IN PERTH EXCLUSIVELY BY

W.A. Apothecaries Ltd.

W.A.'s Leading MAIL ORDER CHEMISTS

110 WILLIAM STREET, PERTH ——— BA 4785

Please mention the "Journal of Agriculture, W.A.,” when writing to advertisers