SOIL and water

Published by the Soil and Water Management Association Ltd. April 1983

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A situation which could easily apply to your drainage business, unless you carefully plan your moves for the coming season. Your skill in moving in the right direction for machinery and more important your judgment in choosing the right plastic pipe manufacturer are the foundations for your future success. When you make the right move — and that's to Hayes Pipes — you can be confident that you'll never be left in a checkmate situation, throughout the entire year.
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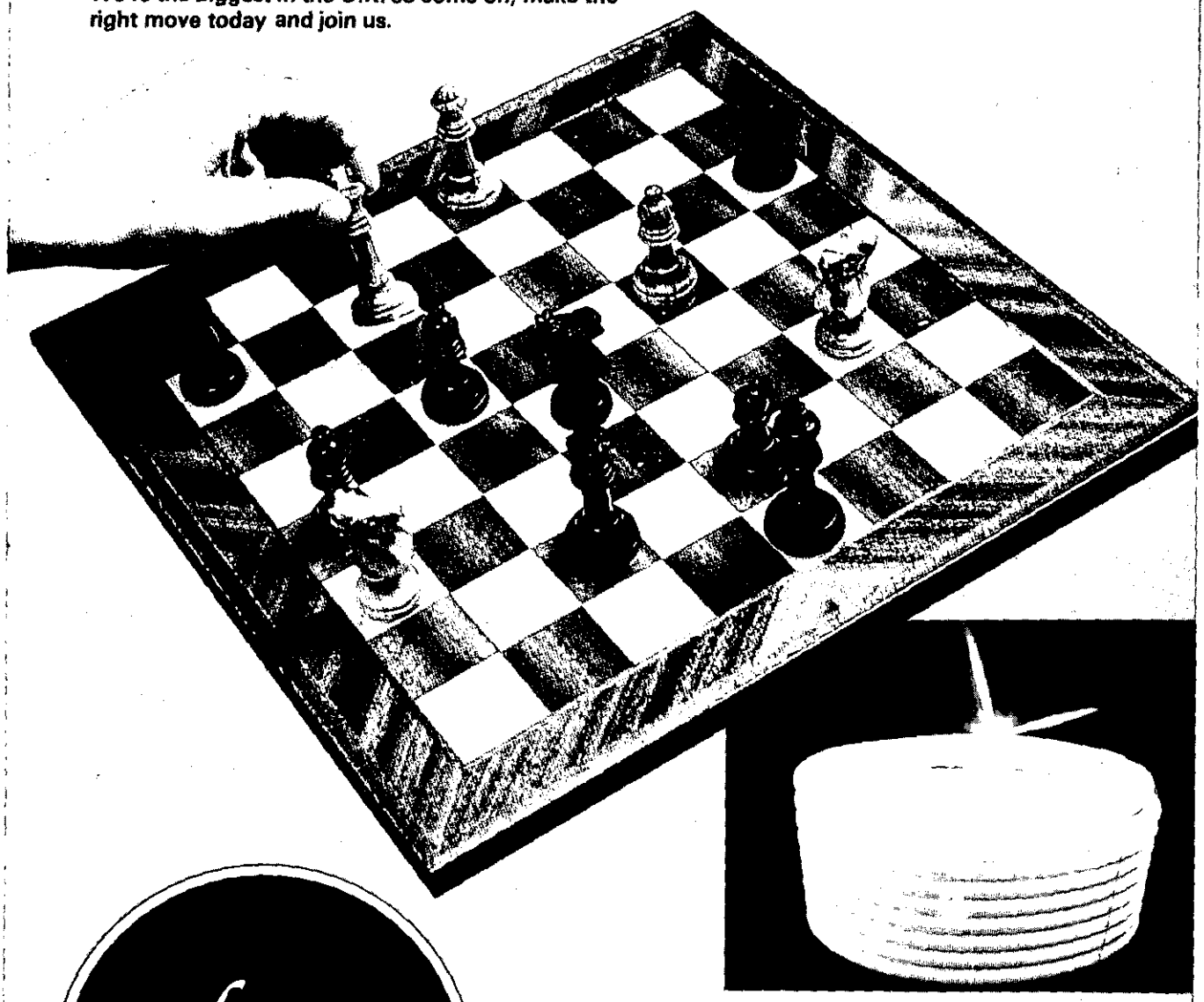

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The Association is a charity whose main objectives are to promote the condition, fertility and management of the soil and its resources.

The next issue will be published in July and will feature autumn cultivations in addition to our regular articles on drainage, irrigation and soil management topics.

COMMENT

SETTING STANDARDS

LAST SPRING in this column, Technical Committee Chairman Mike Darbishire asked for someone to take up the challenge raised by contractors at the 1982 Drainage Workshop and monitor standards of drainage work and installation. A year later it looks as if action is being taken not only in drainage but also the irrigation world.

At the well attended 1983 SAWMA Drainage Workshop (full report in this issue), Mr Laurie Taylor, Secretary of the National Association of Agricultural Contractors, revealed that they were looking at the possibility of implementing a code of conduct for their members. Discussions have been held with MAFF and other bodies and it appears that the LAWS arm of the Ministry will support the scheme. This is not surprising when one considers that it was grant policy changes which made it easier, potentially at least, for the "cowboy" to get away with the installation of a bad scheme.

It is right that the contractors should get together and ensure that the bad apple is thrown out of the basket before it affects the rest and we await the implementation of the scheme with interest. This would be a positive step, and SAWMA supports it wholeheartedly — wouldn't it be nice if, at the next SAWMA Drainage Workshop, the NAAC had introduced an enforceable code for its members which was regularly monitored by a few regional experts making spot checks? It would certainly make membership of the NAAC even more worthwhile.

The irrigation standards problem is not one for contractors, but one of materials and scheme design. Mr Mike Martin, Chairman of the United Kingdom Irrigation Association, has long been campaigning for a code of practice for his members. About two years ago when the Association was formed, this idea, I remember, was one of the key issues to be discussed by the group. The Association is preparing a draft document looking at field irrigation design and it will also prepare a code of practice for design of schemes. These will be circulated to members and discussed at meetings in the near future.

So, two admirable ideas deserving your support. Many drainage contractors and irrigation machinery manufacturers might see it as an invasion of the privacy of their businesses, but farmers need a guarantee and if these schemes help provide it, then it is in agriculture's best interests. Let us first sell the idea together, then we can sell the reputable product through the reputable retailer — namely a member of the NAAC or UKIA.

CONTENTS

PIPELINE...PIPELINE...PIPELINE...

FARMERS WEEKLY EVENT

THE INTERNATIONAL Drainage Event, organised by Farmers Weekly to provide the farmer, contractor, manufacturer and dealer with the opportunity to examine the latest machines and techniques for land drainage both at work and on static display, takes place on Thursday 26 May.

This annual show will be held at Brunton Farm, Embleton, Nr Alwick, Northumberland, and is expected to attract a high quality professional audience of around 8,000 farmers and contractors.

For the first time the event will also be open to manufacturers and distributors of cross-country vehicles.

Mr Peter Bridgeman is the owner of the working demonstration site, and chief contractor for this year's event is Ford and Etal Contracts of Ford Village, Berwick-on-Tweed. Northumberland.

SOIL, STOCK AND STRAW

THIS YEAR'S agricultural demonstration at the Royal Bath and West Show (Shepton Mallet, 1 to 4 June), will feature soil, stock and straw. Staged jointly by the Show's Society, ADAS and Midland Bank, the exhibit will include work from ARC Letcombe Laboratories on soil structure and the use and disposal of straw. Crop yield results from Drayton EHF will illustrate the effect of different cultivations after straw burning, baling and chopping.

TUNNELS BENEATH ROADS

NEW IMPACT moling equipment that makes it possible to create holes up to 32in (800mm) diameter under buildings and roads has been put into service by P. Wright (Plant Hire) Ltd, of Hull, N. Humberside. The company has been contracting successfully with impact moling equipment for several years, but has previously been limited by its equipment to diameters up to 16in (400mm).

In impact moling, a long steel cylinder containing a shuttle is lowered into a trench cut alongside the building, road, or other obstacle, and forced through the earth by pneumatically powered reciprocation of the shuttle.

On receipt of an enquiry, the manager of the service will visit sites anywhere in the country to advise on methods and materials and to give a firm quotation.

FINDING DRAINS

A HANDY kit for the contractor has been developed by Woodbridge Electronic Services for locating existing drain lines without a spade or probe.

Known as the Tracka, the solid-state unit is offered in either Maja or Mina versions suitable for use in most depths and diameters of drainage pipe or underground duct.

The transmitter head section of the instrument can be either jetted or rodded through pipework and emits a powerful signal which is picked up by a hand-held receiver on the surface. Signals are able to pass through soils, rock and even concrete.

Tracka Maja is designed for pipework of 100mm diameter or more up to 6.25m deep, while the Mina model can be used in drains down to 50mm diameter lying up to 4.25m deep.

Supplied in a robust carrying case, the Tracka is available from the makers at 7 Hasketon Road, Woodbridge, Suffolk.

RIGHT READING

MESSRS Davies, Eagle and Finney have completely revised their 287 page "Soil Management" book. Published by Farming Press, the wide-ranging volume is well-illustrated, most readable and a must for your bookshelves. Further details can be obtained from Farming Press Ltd, Wharfedale Road, Ipswich. Tel: (0473) 43011.

sawma news

ON THE MOVE

AFTER TWO and a half years at the helm, Technical Secretary, Mike Saull, is to leave SAWMA to take up the post of Cereal Unit Manager at the NAC. Mr Saull was instrumental in establishing regular calendar events such as the Soil Management course, The Soils and Drainage Workshop and the Soils Centre at the Royal Show. We will not lose contact with Mike who will continue to be involved with soil and water affairs and correspondence should continue to be sent to him. Our best wishea go to Mike for success in his new position.

SOILS CENTRE EXHIBITS

INVITATIONS have now been mailed to potential exhibitors at this year's Royal Show Soils Centre. So far, exhibits in the technical marquee will cover soil erosion, mapping, soil acidity, straw incorporation, sampling equipment, assessment of NPK indices and choice of tyres. If you have a particular message you would like to get across at the event, contact Mike Saull (0203) 555100 for more details.

SUBSCRIPTIONS HELP SAWMA

UNDER A commission agreement with the publishers of the Canadian twice-yearly magazine, Drainage Contractor, SAWMA now receives 10 per cent of any subscriptions placed by members through the Association.

Drainage Contractor articles cover the latest in techniques, equipment and materials, as well as advice on profitable business management and technical reference information. One year's subscription costs $22.00 Cdn (£12.00); two years $36.00 Cdn (£19.50).

Drainage Contractor Black Book III, published recently, includes specifications and photographs of the six wheel-type and 20 chain-type as well as 36 trenchless ploughs introduced by British, European and North American manufacturers since 1979. It is available for $15.00 Cdn (f8.15).

Contractors or industry suppliers who have items of interest for editorial topics in Drainage Contractor should send their suggestions to Peter Darbishire, AIS Ltd, Box 1060, Exeter, Ontario, Canada, NOM 1SO.

GOING TO GROUND

DR DAVID Bellamy, the well-known botanist and television personality, is turning his efforts to helo create a wider understanding of soils. The BBC have prepared a new series on soils to be screened this winter and Dr Bellamy will also be opening a travelling exhibition in Spring 1984 being prepared by Leicestershire Museums. This exhibition, with Soil Survey and SAWMA input, will be at the Royal Show in 1984. More information from the SAWMA office.

READY FOR WHEAT

MOLING operations have been carried out in preparation for the RASE Wheat '83 demonstration at Haslingfield, Cambridge in mid June. SAWMA and MAFF experts will be on hand to discuss moling operations in more detail and will be digging down to examine mole conditions. Through-the-crop work will also be on show.

REMINDER

YOU ARE reminded that subscriptions for the 1983 year are now due. Invoices are now being posted and it would help if individuals could be prompt in making payment.

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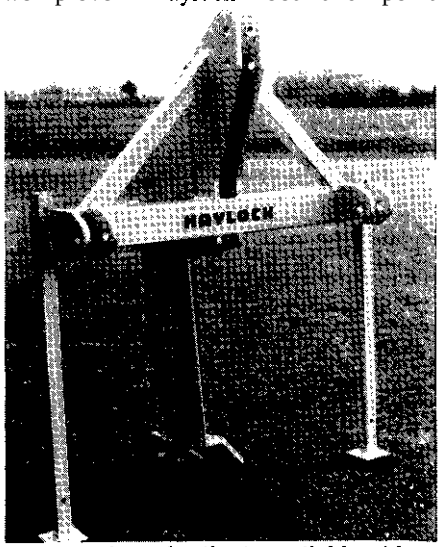
PIPELINE...PIPELINE...PIPELINE...

SINGLE LEG SUBSOILER

SUBSOILERS of one, two and three leg configuration are now available from P. J. Haylock Ltd, Bunwell, Norwich, following the introduction of the new Popular single-leg model to the company's range. Designed for small or medium size tractors, the Popular is equipped with the well-proven Haylock foot and point



The Popular subsoiler is available with or without wings.

assembly as standard. A bolt-on Haylock wing kit is optional. Adjustable parking stands are fitted to the crossbeam onto which the main frame and blade assembly are welded. Price of the Popular in standard form is £295. The wing kit adds £26.

SMALL CHALLENGER

THE PRESENT domination of the under 40hp sector of the UK tractor market by imported makes is being challenged by Massey-Ferguson with their first new model in this power class in nearly 20 years. Rated at 38hp DIN, their new MF 230 is designed to sell at a price that will appeal to livestock and small acreage farmers.

It will be sold without a cab, but can be equipped with a folding safety frame, making it suitable for work in low buildings and areas where height is restricted.

The simple but effective specification maintains a high commonality of parts with other models in the MF range. Features include an eight-forward, two-reverse speed transmission, live pto running at 540 rpm or ground speed and full Ferguson System hydraulics with the exception of Pressure Control.

Recommended retail price of the MF 230 is £5,700, excluding safety frame.

FRAMES FOR HARD WORK

DOUBLE thickness chassis and one-piece sides are features of the latest Kronevator rotary cultivators from Bernard Krone (UK) Ltd, Lady Lane Industrial Estate, Hadleigh, Ipwich, IP7 6BQ.

All models have a permanently oil-lubricated chain drive positioned on the side, and have fittings for Cat I and II three-point linkages. Height adjustment and spring tension hood brackets are standard.

The range extends from the RE251105 angled gearbox machine, suitable for tractors of 25hp upwards and with working widths of up to 105cm, to the heavy duty RES 1201250 with multi-speed gearbox, with working widths of up to 250cm and requiring 120hp.

The Kronevator range has a spike rotor option to turn it into a seed bed aerating tool with easily replaceable tines.

MEASUREMENTS AT HAND

ACCURATE pH and mV measurement facilities are incorporated in the latest band-held, battery-powered instrument from Jenway Ltd, Gransmore Green, Felsted, Dunmow, Essex. Digital readout indicates pH levels from 0 to 14, while mV measurement is from 0 to 1999. Manual controls include a buffer facility and a selector switch for pH or mV operation. Temperature compensation is available from 0 to 100 deg C in the pH mode. Price of the Jenway Model 6071 meter is from £139.

TESTS FOR WEAR

FAST AND accurate measurements for comparison of wear rate and durability of different soil-engaging components and materials are now made in F. W. McConnel's development department with the aid of a specially designed 'bath-full-of-flints' test rig.

The equipment, built by McConnel engineers, has provided the Ludlow-based company with an 'in-house' ability to compare with wear rates of alternative shanks, wear-shin assemblies and points for the Commando Shakaerator heavy-duty vibrating cultivator. As a result, the company's designers are now able to pinpoint the best possible materials and designs for each soil-working component used on the Commando.

BUCKETS, BLADES AND HOOKS

TRENCHING, ditching and tile drain buckets, clay levelling blades, ejector buckets and ripper hooks are among a range of new mini-excavator attachments from P. F. Doggett (Engineering) Ltd, Grangegeeth, Slane, Co. Meath, Republic of Ireland.

JUST A PHONE CALL AWAY

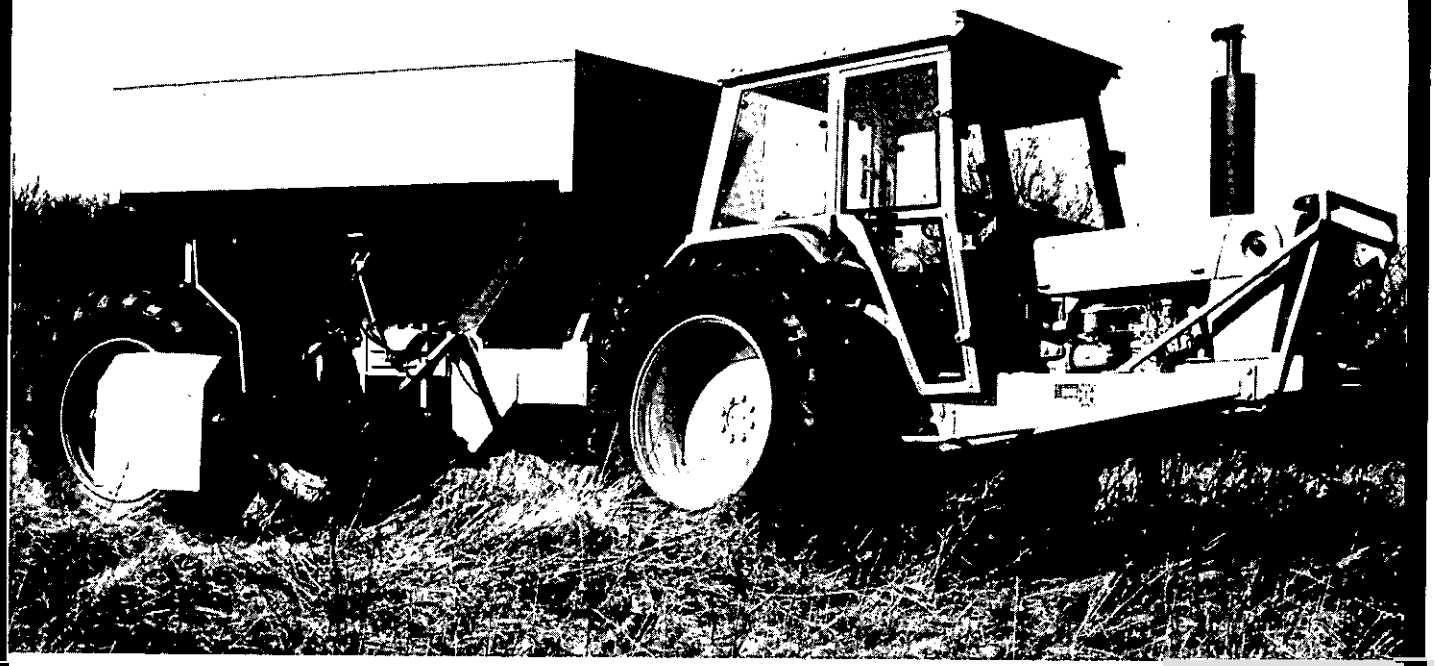
A FREE 'one phone call' service for farmers under which a representative calls to discuss proposed drainage schemes by appointment, then introduces contractors and consultants as necessary, has been launched by pipe manufacturers Oakland.

Contractors and consultants may join Acorn Land Drainage, as their scheme is called, by registering as members. Running costs will be borne entirely by the organisers, there being no charge to either the farmer or to participating contractors and consultants.

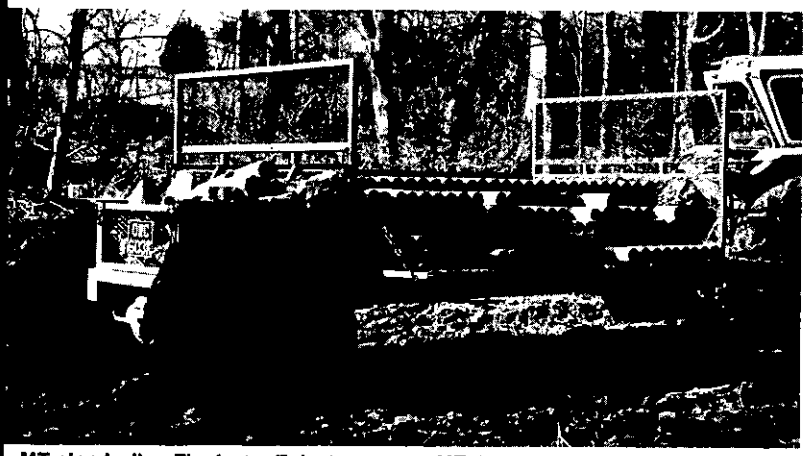
The Acorn phone number is 090487 563.

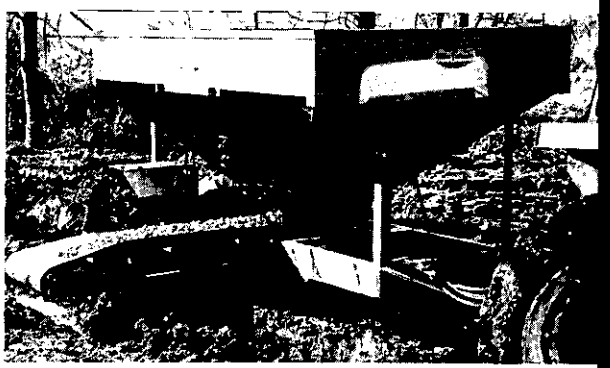
McConnel Commando Shakaerator legs and points ready for comparative wear resting in the company's 'flint bath' test rig.

drainage equipment



YTTRANSTER g : e **trailer.** A O tonne capacity, **self-propelled,** articulated gravel cart with 4 X 4 wheel **drive.** Driven by a Ford 7600 ; it producing **98** DIN hp **at 2100** rpm. Sixteen **forward** and four reverse **gears** with **low/high gear** change on-the-move. **Differential** lock and brakes on all four wheels. Hydrostatic steering with two double-acting rams. High or low conveyor discharge height and in-cab hydraulic control of all hopper discharge functions.





MT pipe trailer. The fast, efficient way of transporting loose, packaged or crated clay tiles and plastic pipe. Seven tonne capacity. Side board lowers for easy transfer of pipes to drainer.

MT back filling blade — Ford *(below right).* A side filling blade designed to fit the full range of Ford 6600, County (small front wheels) and Roadless 78 tractors. Fully hydraulic operation. Supplied with all pipe work and spool valves.

MT 7-tonne gravel trailer *(above right).* Constructed of welded steel components bolted together to make a strong and easily serviced machine. Pto-driven conveyor with high or low level discharge. Hydraulic functions to conveyor lift and hopper door. Fitted with 16 X 34 or 15.00 X 20 tyres.

For further information contact:

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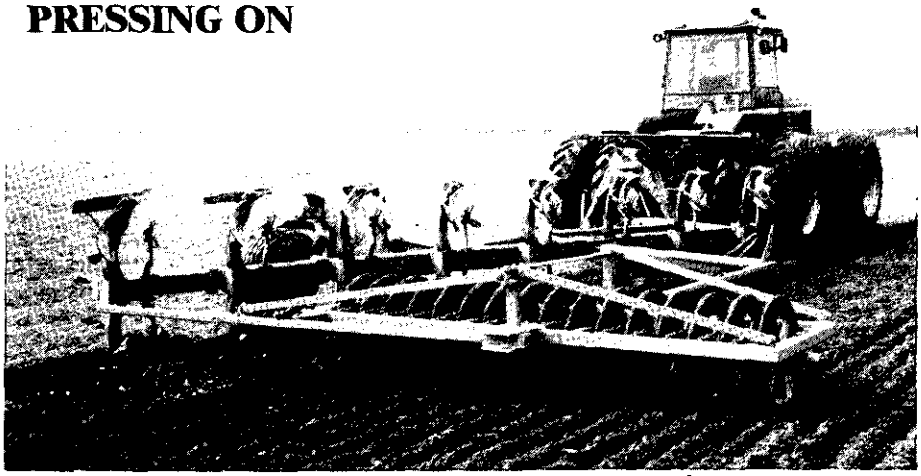
PRESSING ON



A furrow press designed to work with an 8-furrow reversible plough is now made by Hill & Osborne, Burnham Market, King's Lynn, Norfolk. The unit has sixteen, 28in diameter cast iron rings, each weighing 69kg (152lb), and is used to consolidate light or medium soils at the time of ploughing, eliminating the need to roll. It also assists seedbed preparation, moisture conservation and resistance to soil erosion. Hill & Osborne make furrow presses suitable for two to sir furrow ploughs with prices ranging from £1055 to £2675.

EFFICIENT TRENCHER

PHRASES such as 'totally new generation' and 'higher plane of efficiency' are being used by Bruff to describe their BT6 trencher, which will be making its first public appearance at the Farmers Weekly International Drainage Event. The first unit was sold, well before its completion, to Northants Land Drainage, who will have had no more than two working weeks to test its promise before they take it to Alnwick.

Designer Mr David Oldroyd had a brief that gave him all the scope he could want. The power range was stipulated — it has 215hp DIN from a Deutz vee-eight diesel — but apart from that, he had merely to make best possible use of the power in a machine that would incorporate as many contractors' requirements as possible, and would uphold the Bruff tradition of making machines that can still earn their keep after 10 years or more hard work.

The most striking departures from established practice are that the usual torque converter has been discarded as: ". . . inefficient; a waste of power . . .". The digging drive clutch also goes, made unnecessary by a 'turbocoupling', said to be the latest in hydraulic power transmission.

So efficient is the design, Bruff reckon, that drivers will fail to take advantage of the full output available. So they have automated increases and decreases in ground speed, through the hydrostatic transmission, to maximise output according to the working conditions.

SELLING DIRECT

NORFOLK-BASED land drainage equipment manufacturer, K. G. Hoes, is now selling direct. From 1 April, sales throughout the United Kingdom and Ireland of all machinery built by the Hoes Group of companies are handled from the firm's Great Ryburgh factory under the direction of Marketing Executive, Mr Tony Lowndes.

Initially, the main service base will be located at Great Ryburgh although Hoes expect to set up additional depots nationwide. Full details of the new operation and the range of Hoes drainers will be available at the Farmers Weekly International Drainage Event.

SCOTTISH DRAIN LEAFLET

RECENTLY published by the Scottish Agricultural Colleges is an advisory booklet entitled, "Drainage of Soils of Low Permeability". The 20 page SAC bulletin No. 8 is available from any of the Scottish colleges. Addresses from Mike Saull at the SAWMA office.

COMPUTING SCHEMES

CALCULATIONS required to determine the correct sizes of pipe for use as laterals, main drains and open-inlet pipe ditches can now be carried out by microcomputer using a programme written and used by the Land And Water Service of ADAS. The programme uses the same calculation procedure as in the *Design of Field Drainage Pipe Systems (Reference Book 345)* which is now the current method of pipe design in LAWS. It was demonstrated at the SAWMA Drainage Workshop by Mr Adrian Armstrong (MAFFIFDEU) and Mr John Gregory (ADASILAWS).

Listening and learning with the professionals

ENVIGORATING aptly describes the enthusiasm expressed by those attending the 2nd SAWMA National Drainage Contractors Workshop held at Stratford-upon-Avon in January. A determination to review problems, study new techniques and be a part of the 'land drainage team' was evident amongst all the delegates.

More than 200 visitors travelled to this intensive two-day event including drainage contractors, consultants, manufacturers of materials and machines, research and development engineers and soil scientists. Visitors from France, Germany, Holland, Eire, Canada and the USA provided the international content. The overriding objective was to provide a forum for debate and an exchange of experiences. SAWMA prepared and staged a programme of interest and variety which fulfilled virtually all requirements. Mike Darbishire and Mike Saull report:

Opening up

Land drainage contractor, manufacturer and farmer of international repute, Mr Lowell Kraft, described his most recent project during the opening session. Mr Kraft from Michigan, USA, has applied expertise and skills gained over the years to establish his practical ideal in land management. On a recently purchased wet and neglected farm he selected 70 acres of "frog pond" for his project. Mr Kraft's thinking was that by levelling to zero grade he would eliminate low spots and ponding with the consequent overloading of drain lines beneath. Rain water would be applied evenly. He used computer planning for land forming and drainage design, and accuracy has now paid off.

The area is isolated by a one foot levee surround, and the bonus is no water movement except downward which eliminates erosion of topsoil. The scheme also allows for the reversal of flow at low energy cost for sub-surface irrigation, coupled with a non-pollution factor to outside sources. The farm seems impervious to climatic extremes. It could be the first in a new concept in land management.

Future trends in modern drainage techniques

Mr Derrick Clark, Warwickshire contractor, equipment and pipe manufacturer, considered future moves on this side of the Atlantic. Much of what he had to say revolved around the exciting practice of close-spaced drainage (see separate report in this issue) which installs pipe at 3m and 5m spacings. Ultimately he sees the elimination of gravel from schemes on all but the "tightest" soils using a trenchless installed system of shallow small bore pipes with soil stabilizers to leave permeable, well-structured material surrounding the pipe. Mr Clark feels this modern drainage and competitive costs will leave no room for the trencher machine on large comprehensive schemes.

Computing

It is clear that the industry is alert to the potential offered by new and exciting technology. This was reinforced by the excellent and well-attended computer display presented by the Ministry of Agriculture. MAFF experts have written a programme for a popular micro-computer to devise lateral and main drain pipe size together with open inlet pipe ditches which can be used by the contractor with little computer knowledge. From the research side, water table height predictions can be calculated using another programme and, as Cheshire contractor Mr Denis Jones pointed out from the platform, it would not be long before we all have one, whether we like it or not.

Ministry update

Messrs Ian Tring and Stuart le-Grice, heads of MAFF Research & Development and Field Drainage Experimental Unit respectively, summarised the work of LAWS and FDEU. The regionalised experimental programmes were highlighted and anyone interested in visiting sites should contact their local MAFF officer. Mr Tring made it clear that responsibility for quality control and supervision of new schemes rested with contractors and farmers. MAFF/LAWS ▶

Mr John *Gregory, ADAS/LAWS* Preston, runs through the computer program *calculating* drainage scheme *design*.

4
officers are available in a technical capacity as field engineers with no responsibility for supervision of schemes. Surely an added reason for farmers to contract with qualified and experienced drainage contractors.

The legal aspects relating to land drainage are somewhat obscure, delegates were told by solicitor Mr D. K. Alexander. He strongly urged that steps be taken to clarify legislation at highest level in respect of contracts undertaken. Definition in legal terms was minimal and this matter is of increasing danger since the passing of the 1981 Wildlife and Countryside Act. This, he said, has a signifiant effect on the use of many areas of privately owned land throughout the country.

Moling

Professor Gordon Spoor made a welcome return to the second SAWMA Drainage Workshop and urged contractors to treat moling more flexibly. "Most farmers expect mole drains to last for at least five years," he said. "However, this life expectancy tends to restrict the moling operation to certain soils and certain climatic regions. Why not consider them as an effective short term measure?"

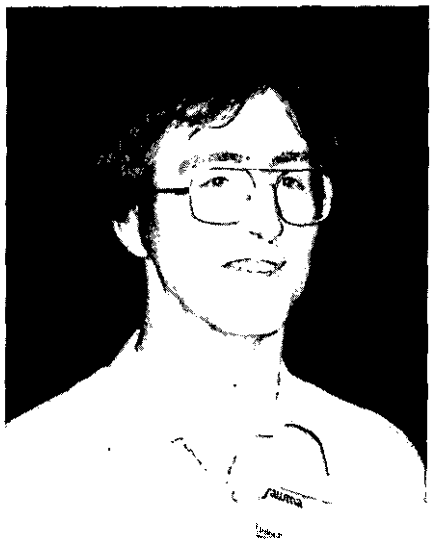
The major benefits coming from a moling operation are the provision of a close-spaced drainage system together with good soil cracking above the mole channel, explained Professor Spoor. This combination enables surface water to move quickly downwards through the soil for rapid discharge through the subsurface drains. Comparing moling with subsoiling systems, the tremendous advantage of moling systems is that they provide both necessary soil cracking and cheap close-spaced drain.

Professor Spoor concluded that moling could be considered acceptable in marginal situations, and could, in many cases, provide a much more effective alternative to subsoiling. Moling costs need be no higher than subsoiling and in some cases could he less.

The installation requirements for successful moling do not change, regardless of moling depth or life expectancy. Adequate slopes with no backgrades will always be required and, wherever possible, no free water should be present in the surface layers at the time of moling. Whilst the achievement of dry conditions after moling is advantageous to increase mole life, it should not he considered in these marginal situations as a major factor in deciding whether to mole or not. Rainfall soon after moling may shorten the mole life, but equally it will reduce the benefits from subsoiling.

Compaction

Mr Anthony Forsyth, a cereal farmer from Warwickshire, spoke on drainage aftercare, so frequently overlooked. He criticised the siting and marking of drain outlets by contractors, with the subsquent damage to ditch maintenance machines and outlets. Outlets were important but greater emphasis must be placed on inlets. and the farmer with soil care in mind holds the key. Timeliness of field operations both at the time of installation of pipes and subsquent cultivation is vital. Compaction by machinery when soil strength is low reduces vertical hydraulic conductivity, causes surface ponding and reduces thk efficiency of the drainage system.



Mr Bernard Rose.

This theme was developed by Mr Martin McAllister of the National Institute of Agricultural Engineering, invited to the Workshop after his non-nonsense approach to traction and tyres on the NCAE/SAWMA Soil Management course. He pointed out that larger tyres would reduce ground pressure and that wherever possible one should aim to use a tyre to carry a given load at the lowest recommended inflation pressure.

The tracklayer is obviously the superior machine when it comes to heavy draught jobs, followed by four-wheel drive with equal-sized wheels, then unequal wheels and finally the standard two wheel-drive tractor.

Mr McAllister considered that very little attention has been given to the tyres on towed machines in the past, manufacturers seeming reluctant to use over-sized tyres, preferring in the majority of cases to use the cheapest tyre which can carry the load. Recent work at the NIAE has shown that considerable reduction in the co-efficient of rolling resistance can be made by reducing inflation pressure, reducing load, increasing size and by use of radial-ply construction.

Fitting 12.50-18 tyres instead of 7.50-16 tyres could reduce the trailer towing force by 50 per cent in poor conditions, 38 per cent in average conditions and 27 per cent in good conditions.

Mr McAllister concluded by appealing to manufacturers to design and fit gravel trailers with wider, lower pressure tyres. This would ultimately help reduce compaction and prolong the life of schemes.

'Breakfast Time' in Stratford

The softly, softly approach was adopted by Suffolk contractor, Mr Bernard Rose, who kicked off the second day's session. With his version of 'Breakfast Time' offerings, Mr Rose minus Selina Scott and company considered that through-the-crop work was the only way to achieve a profitable and full work programme. During 1982 he offered prime discount for work undertaken through the crop and appealed to contractors elsewhere to do the same and market a technique which means that drainage is done in ideal conditions. Work has shown that crop damage can be limited to between 5 and 15 per cent on an annual basis and by utilizing a drying cycle, good soil structure in maintained.

Business matters

The final session provided plenty of food for thought as delegates prepared to weave their weary way home. Mr Peter Charnley, engineer to the North Level Internal Drainage Board and Secretary to ADAS Technical Committee, thought that the land drainage industry should be insistine on minimum standards of design and construction by laying down "codes of practice", hacked up by the Ministry of Agriculture and administered by themselves. It is the standard-cutting "cowboys" who cause difficulties in the industry, he explained. Why not compile a list of approved contractors?

Mr Charnley thought that contractors should be offering a complete maintenance package for both ditches and underdrainage systems. Should not their Association be encouraging manufacturers to produce the right machines? Mr Charnley found it interesting that 99 per cent of farm ditch and under-drainage maintenance in Holland and Germany is carried out by specialist land drainage contractors.

In response, Mr Laurie Taylor, Secretary of the National Association of Agricultural Contractors, confirmed that his organisation was looking at standards and codes of conduct. He hoped that a more aggressive approach would bring back members and form a strong body recognised by kindred organisations as representative of agricultural contractors.

Conclusion

The Workshop succeeded in creating a platform through which people directly concerned in land drainage could establish a communications link. Farmers can be assured of improved codes of practice by those who are determined to be professionals.

Soil and Water Management Association acknowledges the support and assistance of the manufacturers whose sponsorship helped make the event viable.

PAPERS OF THE WORKSHOP PROCEEDINGS ARE AVAILABLE IN A 50 PAGE BOUND VOLUME PRICE £6.50 FROM, MIKE SAULL, SAWMA LTD, NAC, STONELEIGH, KENILWORTN, WARWICKSHIRE CV8 2LZ. Tel: 0203 555100.

Closing the gap

ONE SUBJECT to the forefront of the many discussions at the SAWMA Drainage Workshop was closed-spaced drainage. In the same week as the event, and less than 10 miles away, Warwickshire e rep ur Mr)errick Clark, throwing tradition aside, unveiled machinery and methods to provide shallow-depth close-spaced pipe schemes.

The great advantage of the system, which Mr Clark is careful to point out is a return to depths and spacings used long ago, rather than a completely new technique, is that the use of porous backfill is completely avoided. His case for close spacing, apart from that, is that it makes pipe depths greater than 30in unnecessary and that close-soaced pipes are more reliable than the moie drains traditionally used between wider-spaced laterals.

By close spacing, Mr Clark means either 35mm pipes 3m apart, or 60mm pipes at 5m spacing.

In general, Mr Clark reckons, the savings in the costs of gravel and its handling more or less balance the extra cost of pipes and installation in the case of 60mm pipe at 5m, and 3m spaced schemes are mostly likely to cost only about an extra £50 to £80 per hectare.

These costs are a bargain, Mr Clark believes, when it is borne in mind that the pipes are far more effective than moles, that the soil is shattered by the heave of the drainage operation at the same close intervals that the pipe is laid, and that there is none of the heavy transport across the field, causing soil damage, that is inevitable in hauling gravel back-fill.

A further point made forcibly by Mr Clark was that although the first moling operation may be carried out satisfactorily, the job was often badly repeated later. Re-moling was sometimes done in completely the wrong direction, he said.

Mr Clark considers that the installation of a close-spaced system is well within the reach of any land drainage contractor. Adapted trenchless machines can be used to lay both main drains and more difficult laterals using laser equipment, backed up by a mini drainer also of trenchless design. Such a mini drainer is now built and marketed by Mr Clark's company Drainage Equipment Ltd to fit large tractors or crawlers.

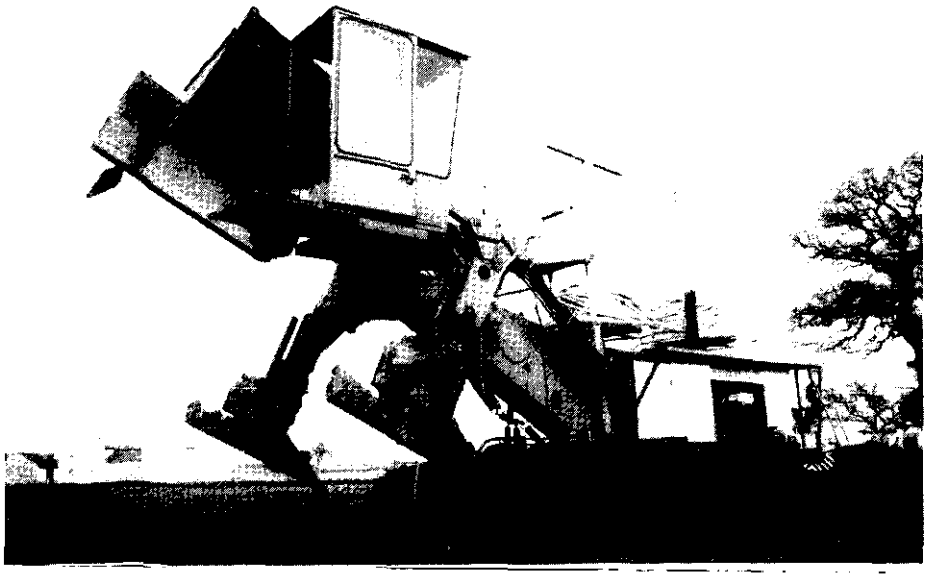
Over the past five years Mr Clark has laid about 400 hectares of close-spaced drainage using 60mm corrugated polypropylene tubing 0.5m deep at 5m spacings. Typical costs for the scheme before grant are about f620 per hectare and can compare quite favourably with porous filled schemes with laterals at 20m spacings.

Everywhere one turned at the Warwick demonstration there was something new — from machinery and special-purpose strakes on tractor wheels to fast and easy pipe cutters for the numerous connections which have to he made on this system. I was particularly impressed with the shatter achieved by the NCAEID. W. Clark-designed plough leg. This is increased by the addition of wings on the drainer foot. Furthermore, specially-designed cutter blades are attached to shear topsoil and place it directly on top of the pipe. This in theory will be more stable and help prevent recompaction or slumping above the pipe. Indeed, Mr Clark is experimenting with soil conditioners and stabilisers which could be sprayed direct on to the top soil before it is incorporated at depth.

The larger twin-legged Bruff machine which was being used to lay two 35mm pipes simultaneously at 3m spacing incorporated all the refinements of the single-leg Minidrainer, including discs to cut the turf on either side before the drainer leg passed through. This helps prevent clods being brought up. Also fitted to the Minidrainer tractor was an interesting set of strakes. Such is the enthusiasm of Mr Clark that I am told that following their inconclusive showing on a press day earlier in the week, he had crosspieces welded between the strakes so that contractors two days later viewed a much more convincing performance.

Work with the spade reveals that the Derrick Clark/NCAE-designed drainage lea gives excellent soil-loosening to full pipe depth.

Twin-leg adaptation on a Bruff TG7 to lay two 35mm polypropylene drainage pipes simultaneously at 3m spacing.



Mr Clark says that for effective close space draining, contractors should:

- Grade effectively, using a laser.
- Set tine wings to produce accurate grading yet create effective fissuring and lifting of the upper soil layers around the pipe.
- Consider using shallow leading tines to work from the top down.
- Design the scheme to keep the main well clear of the hedge by installing parallel laterals on the inside of the main.
- Use easy connectors and junction units.
- Use Superkoils and high quality pipe.

Mr Bob Fry, of the National College of Agricultural Engineering, speaking on the Drainaee Workshop platform, pointed out &at much we considered to be new in land drainage has been tried by our forefathers. In 1880, for example, one was either a shallow or a deep drainer. Furthermore, we already had quite an effective, economical, close-spaced drainage system for clay soils, as seen by moling, so why bother? Well, farmers would clearly like a close-spaced permanent system, in which they had confidence. Contractors and farmers alike would like to do away with gravel back- ▶

4

fill, thus the reason for NCAE involvement in the project.

The designed system puts drains in at 50 to 60cm depth, with lateral spacing similar to those of a mole in a mole cum tile system. No permeable fill was necessary, and laterals were connected direct to the main.

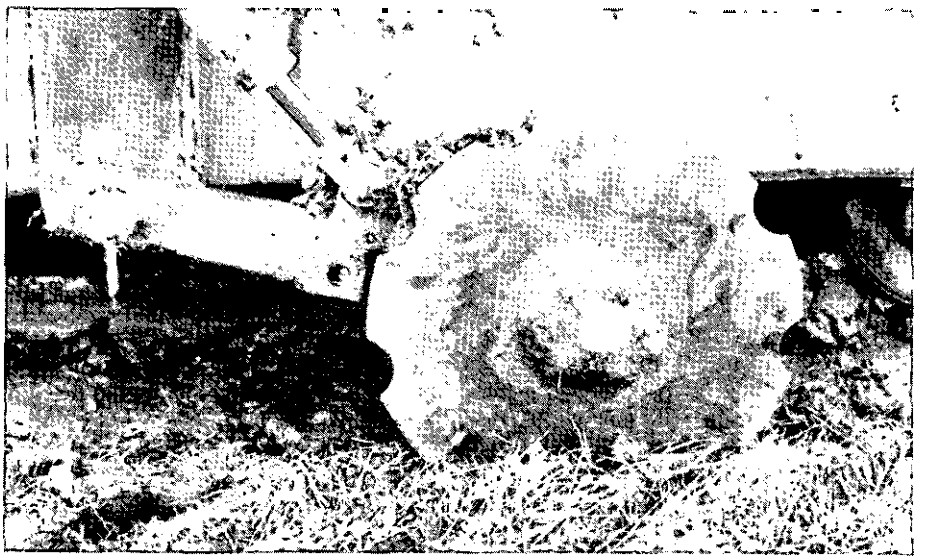
A specially-designed prototype plough was manufactured by NCAE and Mr Derrick Clark with Mr Gideon Sinai. The key to the design was to produce a plough giving good loosening and effective grading.

Mr Fry gave four major savings for the system:

- No permeable fill.
- Smaller diameter pipes (25-35mm).
- Less draught by installing pipes shallower (0.5-0.6m). Doubling this depth of operation increased draught eight times.
- Less initial capital outlay for machinery. The Derrick Clark Minidrainer was obviously cheaper than more conventional equipment.

Against the obvious savings, Mr Fry stressed that no-one really knew what the long term performance of the system was likely to be, and that further work was needed to check a number of likely problem areas before he would recommend the system to farmers. Possible problems listed by Mr Fry included:

- Grade control: This is critical for small pipes and difficult to maintain. The pipe may ride up into cavities, though this would hopefully be prevented by topsoil placement by means of cutters on the drainer leg pushing more stable soil into the zone around the pipe, as with the Clark-designed machines.
- Root blockages: By placing pipe within the active rooting zone, grass, rape, kale and sugar beet could cause blockages.
- Siltation.
- Soil reconsolidation: The degree of cracking and structure above the pipe are important, and bearing in mind the closeness of the pipes to the surface, reconsolidation due to farming operations could he a problem.
- Pipe strength: Damage from traffic might be possible.



Top-soil cutting discs to either side of the leg allow equal 'heave' and prevent clods being brought to the surface.

Mr Fry was being cautious on these points, and certainly did not condemn the system. Indeed American trials, he said, showed little cause for concern over potential root growth, reconsolidation or strength of pipe.

Laying down the benefits of Norflex plastic drainage is easy.

1 We are one of the major manufacturers of PVC land drainage pipe in the United Kingdom with associated production companies manufacturing in West Germany, France, Australia, New Zealand; India and Jordan, giving years of experience in land drainage in Europe and throughout the world.

2 Our pipes can be collected or delivered from over 30 distribution points throughout the country.

3 Norflex PVC land drainage pipe is manufactured from high quality unplasticised poly-vinyl chloride. It is resistant to chemical attack and has extremely good flow characteristics, it is produced in 60mm, 80mm, 100mm, 125mm and 165mm widths. We also manufacture R-Drain in 150mm and 250mm widths.

4 All pipes in the Norflex range are approved by the Ministry of Agriculture. Fisheries & Food for use on grant aided schemes.

5 Norflex PVC coiled pipe is regularly tested and approved by BSI Inspectors to BS4962 specification.

6 Soil movement makes little impression on continuous plastic coiled pipe-so that the risk of blockage is virtually eliminated and a Norflex coiled PVC continuous land drainage pipe scheme can be water-jetted to clear silting.

7 Norflex coiled PVC land drainage is extremely strong but light in weight.
It takes five, trucks to carry the equivalent clay pipe to one load of Norflex land drainage, that is about 90 tonnes of clay pipe to be off-loaded and handled across the farm to site with all the potential problems to soil and paths and roads that the weight implies.

8 All Norflex junctions are designed to ensure that the scheme is a continuous connected system all the way. If you lay the clay equivalent to one truckload of Norflex plastic, then you have approximately 45,000 unconnected pipes, possibly subject to soil movement caused by heavier modern machinery.

9 Norflex coiled PVC land drainage pipe can be used on all trenching and trenchless machines and for through crop draining.

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Distribution companies for Northern England: Telephone (0228) 711072/711002 and for Scotland: Telephone (035 52) 38155

Mr Lowell Kraft.

Refreshments to hand in the PLDMA hospitality area. Left to right, Mr Doug Castle, Mr Dick Hughes, Mr David Masters and Mr Barney Toulson.

Workshop through the lens

Mr Bill Eddy of Eddy Oxford Enterprises, Canada, discusses business with Mike Saull.

Mr Peter Dummett, Woodbridge Electronic Services, explains the Tracka pipe-tracing system.

Mr Bob Fry (left) talks drainage with Mr Richard Warburton of ADAS.

Workshop convenor, Mr Mike Darbishire, with Herr Liebrecht of Steenbergen.

Drainage talk: From the left, Mr Anthony Forsyth, Mr Jim Wheeler, Mr Derrick Clark and Mr Ray Hyen.

Verbal activity in the Scanlaser hospitality room. L to r: Mr Richard Watson, Mr Robin Disney, Mr Bob Craik and SAWMA's Technical Secretary, Mike Saull.

Mr Jan Van der Steldt of Inter-drain entertains,

The Barth-Townsend team, less Mr Peter Townsend.

V11-2

Wash away your cares

MR DAVID MERRILEES, Drainage Adviser from the West of Scotland College of Agriculture, told the SAWMA Drainage Workshop in January that iron ochre build-up is crippling drainage schemes in south west Scotland. In a survey of 100 recently installed schemes, one third of the pipes were affected to some extent.

West of Scotland researchers are currently monitoring a 3 hectare peat alluvium site, drained in June last year, with a whole host of pipe and filter treatments, some including air locks on outfalls.

But what of the problem south of the border? Well, judging from a number of demonstrations organised by ADAS Land and Water Service and comments from regional surveyors, ochre build-up is of localised importance, occurring in soils with a high level of iron compounds. Work by Henning on the continent suggests that it is one of the major causes of pipe blockages on peat soils.

Relative occurrence of drain clogging in various soils. (%)

	Peat soils	Mineral soils	Average
Silt and sand accumulation	43	79	66
Iron clogging	56	15	30
Others (root ingrowth, subsidence, pipe defects, etc.)	1	6	4

A recent publication' by German worker, Professor Kuntze, gives an excellent summary of ways in which silting or ochre build-up can be alleviated and catered for at scheme installation. In our armoury are methods such as:

- Repeated subsoil loosening — promoting oxidation and precipitation of the iron in the soil. However, any succeeding iron reduction in the soil must be avoided.
  Addition of lime to uromote precipitation.
- Use of filter material.
  The vyredox method (passing of oxygen-rich water into groundwater).
  The use of steep drainslopes.
- The use of clay pipes. The adhesion of plastic surfaces exceeds that in clay pipes by up to 30 per cent (even in smooth pipes).
- Correct choice of inlet openings to drain pipes.
- Use of drains below the water to prevent oxidation.

These methods are probably effective given forethought. However, what if ochre has already built up? Professor Kuntze concludes that: "In the long run, continuous maintenance cannot he avoided to meet major iron ochre hazards". Flushing is therefore important as a means of cleaning pipes which have become or are likely to be silted up.

Jetting

Jetters can now flush drains up to 400m long at a time and are now being widely used by contractors and drainjetting specialists in areas where silting and ochre formation is prevelant. There are basically two types of machines: High pressure, low water volume machines — with a better reputation where ochre exists. And Medium pressure, high water volume machines — more suited to clay tile schemes and siltation problems.

Some drainage advisors prefer the high pressure models for use with continuous plastic pipes and lower pressures for clay tiles, which could be pushed out of alignment, but there are no hard facts available to confirm this likelihood.

The machines work by introducing a reel of high pressure hose and nozzle with rear-facing jets into drain outfalls, with the water pump on most models being driven by either a tractor power take-off or chassis-mounted engine. Water passing through the nozzle propels the hose forward and cleans at the same time.

Timing

ADAS advice is to jet in winter or early spring when the drains are running. In summer, 'fines' and ochre tend to harden and become more difficult to dislodge. The success of the operation will depend on the extent and nature of the clogging, but regular checking and flushing is advised. Costs will varv but recent figures from East Anglia and the North West work out at about £10 to £15 per hour for a full contractor service.

Checking

To check your system, look for light brown or coffee coloured discharges from drain outfalls and slightly coloured or oily patches on the water or sides of surrounding ditches. If in doubt call in your local Land and Water Service officer.

Because drainage schemes are costly to install, farmers with likely ochre or siltation problems may consider purchasing their own jetting machines. There are five or six companies marketing machines in this country and prices are upwards of £2,000. Surely this or the use of a contractor is a small price to pay to maintain schemes in tip top condition? Remember that if silatation or ochre does start to built up, the longer it is left the harder the deposit becomes and the more difficult it is to remove.

*"Iron Clogging in Soils and Pipes: Analysis and Treatment", *by Professor* Kuntze *is available from* Pitman Books *Limited.* 128 *Long* Acre, London WC2E *2AN. It is sold* in paperback — 200 x 149mm — 148 pages, price £9.50 per copy including post and packing.

Companies manufacturing jetting machinery include:

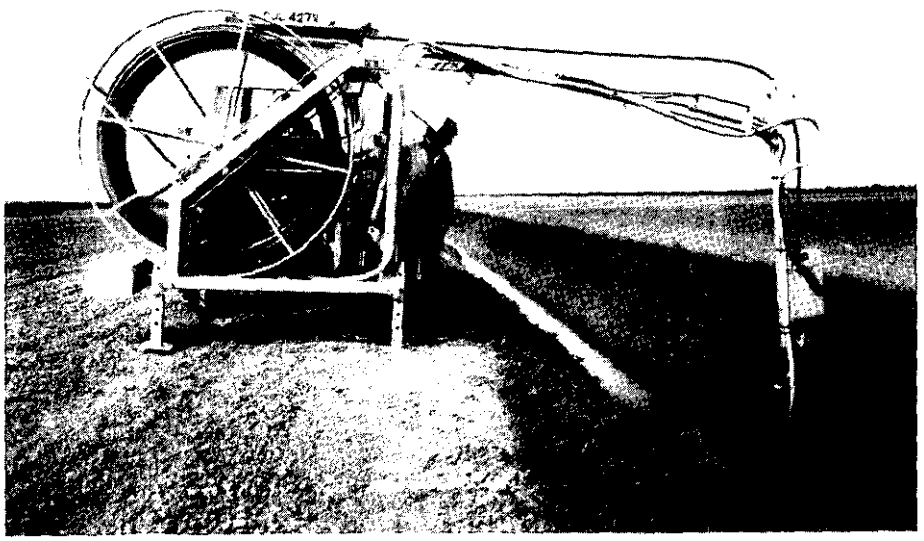
Barth-Townsend Ltd, Meadow View, Markham Moor, Retford, Notts.

G C Ogle & Sons Limited, Victoria Road, Ripley, Derby.

Overland Machinery Limited, Sudbury Road. Gt Welnetham, Bury St Edmunds.

J Mastenbroek & Co Ltd, 83 Swineshead Rd, Wyberton Fen, Boston, Lincs.

Nauldale Engineering Ltd, (Hydrojet Division), PO Box 42, Stockton, Cleveland.



Tractor-mounted BDS-2 drain jetter from Mastenbroek with hydraulically-powered arm can work from either side of a ditch.

IRRIGATION

Applying that water the profitable way

Great efforts are needed to get farmers thinking and talking about irrigation, especially when water aplenty is dropping out the sky at the time of the discussion. Yet the United Kingdom Irrigation Association managed to attract almost 250 interested 'irrigators' to its conference at the National College of Agricultural Engineering in mid-February, with about half the number comprising active farmers. The theme of the day was "Making irrigation pay", and, as Mike Saull reports here, the key to profits centres on precision and timeliness of application.

UPTAKE OF IRRIGATION by farmers is apparently as unpredictable as the weather. The practice expanded during the 1950s and 1960s to reach a peak in 1967 after which sales gradually declined until 1975 and 1976 when, provoked by the drought, farmers once again reached for their cheque books.

The conference opener, Mr Bob Hart, set out to analyse this trend and look at the current and future roles of irrigation in UK agriculture. Mr Hart, Farm Director at Gleadthorpe EHF, listed four main benefits from irrigating:

Yield increase — which varies from year to year and is not as consistent as:

Improvement in the quality of some produce, notably potatoes.

Removal of the inconsistencies of produce yield and timing.

Insurance against severe financial loss in dry seasons.

Yet farmers seem reluctant to invest, said Mr Hart. 1977 census figures indicated that less than 7000 holdings claimed to have irrigation equipment, but of these some 3300 were holdings of less than 20 hectares, irrigating mostly fruit, vegetables and protected crops. What is perhaps also surprising is that grassland was the largest area area irrigated (30,000 hectares) followed by vegetables (25,000 hectares), maincrop potatoes (22,000 hectares) and sugarbeet (18,000 hectares).

Mr Hart presented figures covering 24 years of work with maincrop potatoes at Gleadthorpe EHF (see table), indicating that only in ten of those years did potatoes respond with large yield increases to high amounts of irrigation. "It is imperative that irrigation capacity is high enough to cope in these years, and it is then that the main cash benefit is seen," he said.

The report of the Advisory Council for Agriculture, "Water for Agriculture; Future Needs" (February 1980), concluded that crops being irrigated were receiving only 50 per cent of the water they needed or could have received to achieve maximum potential yields. Mr Hart posed the question: "Is this lack of equipment, knowledge or water?" The Committee had also predicted a jump in the area of outside crops irrigated from 123,000 hectares in 1977 to 309,000 hectares in the year 2000, but Mr Hart concluded that this figure would wrohahly not be reached. This was despite a continuing shift to potatoes (a drought sensitive crop), the need for better food quality, a revival in peas and an increase in response to cereals to irrigation.

Response to irrigation of potatoes (compared with **unirrigated** plots) over a 24 year period at Gleadthorpe EHF.

	Yield increase per year (t/ha)	Average amount of water applied (mm)
Low response (8yrs)	0.0	62
Medium response (6yrs)	4.8	114
High response (10yrs)	22.3	160

One reason for this was that the price of the end produce was not rising fast enough to keep up with equipment prices.

Conference Organiser and Honorary Secretary of the UKIA, Dr Mike Carr, set out to help farmers identify the need for irrigation, hut he warned from the start that it is often difficult to identify yield increases due solely to irrigation, when soil condition and weather will all effect the water balance.

Average yield response figures noted by Mike Carr for grassland are 0.025 tonnes a hectare per mm and for potatoes 0.08 tonnes a hectare per mm, although average results, including these from NCAE, can be misleading and it is the peak event or most extreme condition which can give better returns. The cost of installing and running a scheme was easily worked out, hut it was difficult to relate this to meteorological variability, soil types, different crop responses and contrasting management levels in order to predict yield response and likely returns.

NCAE research on nitrogen interaction and water supply indicates that the value one can get from nitrogen is most economic if water is applied as well. Thus one could argue a case for irrigating to more fully utilize nitrogen.

Soil management is also critical to help utilize reserves of moisture. Research has shown that yields are higher using irrigation on potatoes grown in beds when compared with ridges. Deep soil loosening as an additional measure before bed formation also gives a better response, especially when fertilizer is incorporated at depth. Dr Carr concluded that the yield of potatoes grown in ridges which

Dr Mike Carr

have been irrigated, was often the same as the deep-loosened bed system approach when no extra water has been applied. Soil management is therefore very important.

Scheme design

Scheme design can be split into three parts: Infield equipment, the distribution system and the pump and prime mover.

A warning to farmers from Mr Gordon Bennington of Wright Rain to ensure that the different components of a scheme matched each other was backed up by Mr Mike Martin of E. Rand & Sons. Mr Martin, in his role as Chairman of the UKIA, announced that the Association is to prepare a code of practice for design of schemes. Some, he thought, might consider this to be an intrusion into their businesses, but it should he for the farmers' benefit.

LEPA from Texas

Overseas visitor, Professor Bill Lyle, provided light-hearted and interesting relief for the delegates, when he compared their problems with those of the semi-arid high plains of Texas with an evaporation rate four times the level of rainfall. All their thinking is tuned to maximum water use efficiency and tradition dictated that furrow irrigation was used. However, this system was inefficient and research had led to a low energy, precision application system being devised.

In the initial stages of development, the system was described as a mobile trickle system in which a large number of small stationary outlets of a conventional trickle system were replaced with a small number of large moving outlets. The high flow rate, however, could hardly be construed as trickle irrigation and the concept has since been labelled a low energy precision application (LEPA) system.

The method has been extensively tested and compared with furrow and sprinkler methods which are the primary methods currently used in the United States. The evaluation included application efficiency, distribution uniformity, water use efficiency and energy saving potential. The LEPA system was superior in all categories tested. Professor Lyle gave yield data which supported the irrigation efficiency results and this, combined with significant savings of both water and energy, indicate, he concluded, an economic justification for conversions to LEPA irrigation.

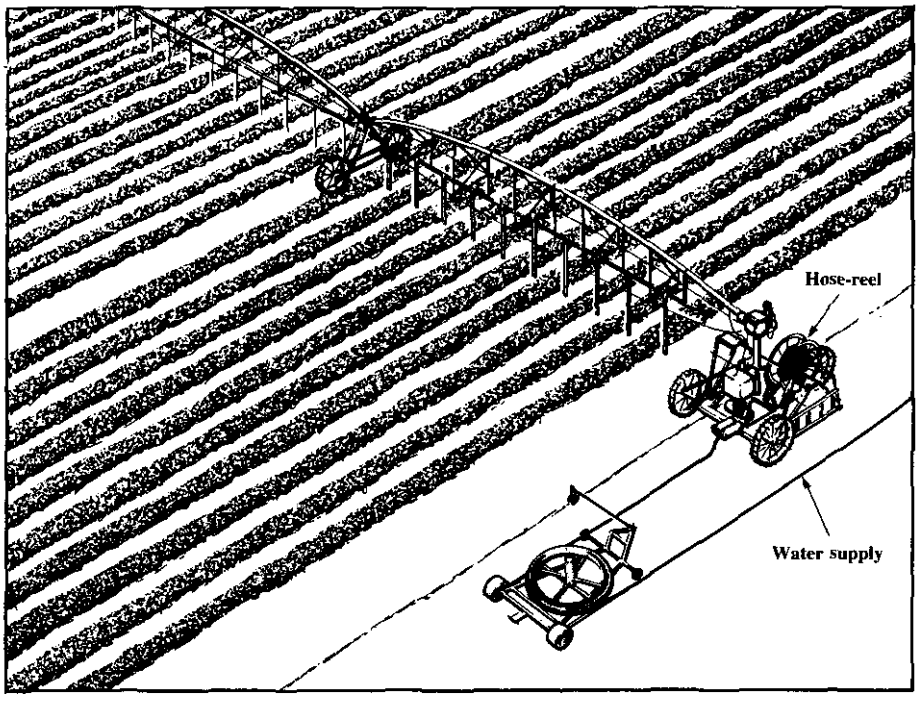
When and what to apply?

Efficiency in this country is perhaps not quite as critical, however, knowing that correct application rate and timing is important information required by the British farmer. Mr John Whitear from Norsk Hydro's Levington Research Station recommends computers to aid water balance accounting.

The manual system for making calculations, developed by ADAS at Gleadthorpe, is to record crop cover and rainfall and from an estimation of daily evapotranspiration calculate the soil moisture deficit in mm. However, Mr Whitear considered that the system falls down on two points because evapotranspiration reported is for grass. Other crops can give higher figures and, with high amounts of rainfall one can get errors in drainage loss calculations. Another drawback to the system is that a manual entry has to be made every day and this can be quite a headache if staff are inefficient.

Simple desk-top computer systems can make considerable improvements if the calculations are based on actual meteorologial data for the area on each day. These can he corrected for the crop, the amount of ground cover, any disturbance of bare soil and the current size of the deficit. Programmes have been developed on the computer at Levington Research Station to do this for any farm in Great Britain and these provide the basis for the Norsk Hydro Irrigation Service (formerly Fisons).

The system requires basic information to be gathered in the winter detailing soil type and water holding capacity as well as crop and irrigation method to he used. Then from April, weekly data such as daily temperature, sunshine, wind speed and vapour pressure are fed into the computer along with weekly site information such as rainfall, irrigation application and percentage plant cover to predict daily soil moisture deficits for each site. Information is passed by first class post and the computer can produce four reports a minute following receipt of farmer information by phone.



The LEPA system from Texas.

Breckland farming

Mr Bill Sloane, Manager at Elvedon Estates, near Thetford, is one farmer who uses irrigation to eliminate the influence of water stress factors on his sandland crop. He started irrigating in 1980 when the decision was taken to switch from dairying to an arable system. Although problems were encountered with grant applications, and being able to schedule getting the job done, he hopes to have eight boreholes operating this year.

Hose reel machines are used on Mr Sloane's estate because there are a large number of trees, and small fields are commonplace. Thus, a 110 mm hose reel machine operating at 75 per cent of its capacity is his solution, which, with an extra 25 per cent at his disposal should suit his needs if another 1976 drought occurs.

At Elveden they are now able to grow any crops. Irrigation is improving not only sugar percentage and 1000 grain weight but also the value of the land. To prove the point, Mr Sloane assessed one irrigated and one unirrigated field of sugar beet variety Monoaire. The unirrigated field yielded 46.2 tonnes a hectare with a sugar content of 15.7 per cent, however, where 120.9 mm was applied to the other during mid June, July and early August — 66.9 tonnes a hectare and 15.9 per cent sugar were the figures. He concluded that if this figure is impressive he would expect to get even bigger responses from irrigation of cereals over the next few years.

Irrigation then appears to be here to stay. If accurate timing and application rate is coupled with sensible soil management, there is no doubt that irrigation can increase crop yield and value. However, be warned that it is in the extreme year that benefit can he accrued and you have only yourself to blame if the system you have installed doer not meet the required capacity.

Liquid on the land – a look at the latest products and techniques

Bauer

A vacuum tanker is a well tried and tested means of applying slurry or water to the land. Its use can be limited, however, during wet periods and in hilly areas. One solution is the Bauer Kombi tanker. fitted with both a compressor for vacuum operation and a high pressure centrifugal pump, which permits liquid to be applied from the headland or farm track up to 50 metres into the field.

Also from Bauer comes a free computer advisory service for both clear water and organic irrigation. First introduced at the Royal Smithfield Show, the service is now nationally available from the UK sole distributor, British & General Tube Co Ltd, Trading Estate, Slough, Berkshire.

Ardleigh Swift

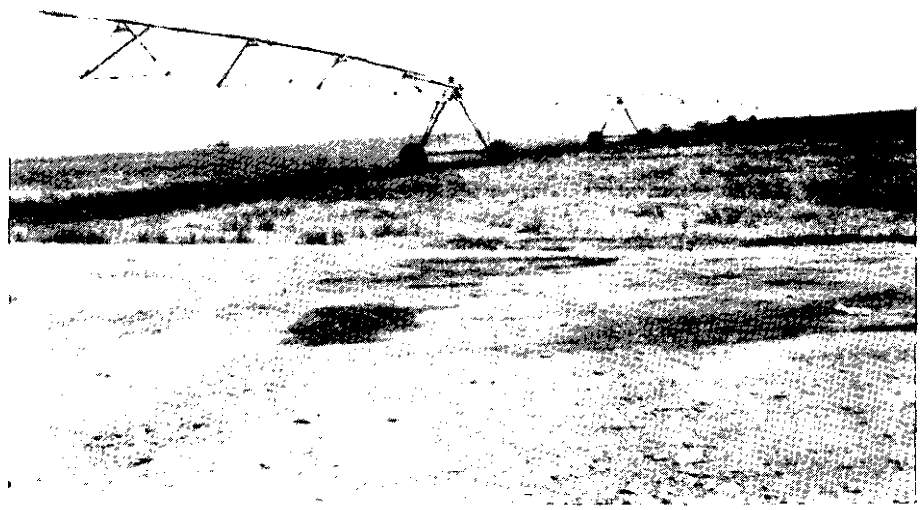
This Colchester-based firm can supply a low-level, self-levelling irrigation boom able to irrigate 45m wide with either spray jets or sprinklers. The unit can be fitted to most existing hose reel irrigators and works at low pressure for watering small seeds and in windy areas where raingun jets may be deflected. Features include adjustable wheel widths, easily folded boom for transport and movement by tractor or a standard reel irrigator with turntable.

Perrot

Perrot say their Centre Pivot systems are now in demand in heathland areas of the United Kingdom where low rainfall and intensive cultivation provides highly cost effective use for the equipment.

The firm's centre pivot is available in a range of sizes capable of covering from 16 hectares (40 acres) up to 220 hectares (545 acres). Both travelling speed and the water application rate can be altered by the operator to suit requirements, and the equipment can be fitted with either sprinklers or low pressure nozzles. Final choice depends on the state of the soil, crop and water table.

Perrot also offer the Transpivot to water corners not covered by the centre pivotsweep.

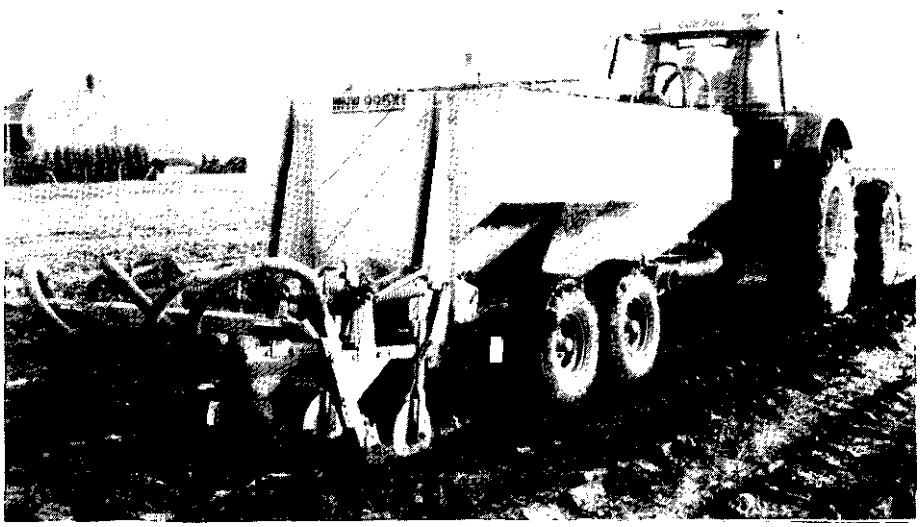


Perrot Centre Pivot *system:* Growing demand in *Britain.*

J. Pett Engineering

Following their award at the 1980 muck demonstration for an outstanding contribution to farm waste management, Pett have continued to apply company energy on practical approaches to waste material handling. The latest result of this policy is the development of the Turbogun principal which, supplemented when necessary with a slurry strainer, enables most slurries to be applied direct to the land without form of mechanical separation.

Slurry and sludge *disposal* at rates up to 28,000 gal an acre, *without* run-off or smell, has proved successful using an injection system developed by Paul Seward *& Co, Acaster* Lane, *Bishopthorpe,* York. Evolved in conjunction with *Water* Authorities *and BKW* Engineering, who designed rhe tankers, the system combines a new *centrifugal pump* linked to Skjold injectors for block- and *pollution-free* disposal.



Hose-reel roundup

Bauer

Manufacture Rainstar hose-reel irrigation equipment with piston or turbine drive. External hose diameters from 63mm to 125mm in 200mm to 400mm lengths.

Javelin

Offer 17 lrrifrance models of 50mm to 110mm diameter hose; lengths from 250 to 400m.

Evenproducts

Evenproducts specialise in small to medium size irrigation equipment. The Evencreep Mark 1 to 4 models range from 25mm to 60mm external hose diameters in lengths from 100m to 250m.

▶

Omme

Eight sledge irrigator models available — 53mm outside hose diameter, 250m to 350m hose lengths.

Perrot Irrigation

Three basic versions:

● Minimat with fixed rear or side delivery. Pipe diameters from 50mm to 63mm. 250m to 270m hose length.

● Rollomat with traversing side delivery. Pipe diameters from 75mm to 110mm. 270m hose length.

● Peromat with rear delivery or turntable. Pipe diameters from 90mm to 125mm. 280m to 400m hose length.

J. Pett Irrigation

Manufacture the One/30 Rainmatic and Three1150 Rainmatic models. The former has an outside pipe diameter of 38mm and length of 274m, and the latter, 76mm and 428m respectively.

Stenumat

Handled by Watkins Nayler and consisting of two reel irrigation models — the Mini and Major of 82mm and 125mm diameter hose and lengths of 300m and 450m.

Wright Rain/Farrow

Market three Touraine models, ranging from 50mm to 82mm diameter hose; 270m to 320m lengths, and three Super Touraine models, all with 90mm hose and lengths from 300m to 370m.

Farrow – Dolphin Irrigators

Also from Wright Rain, including eleven models from 51mm to 102mm pipe diameters and 100m to 200m hose lengths.

Addresses and 'phone numbers for further information

Bauer Division,
British & General Tube Ltd.,
Trading Estate,
Slough.
Berks,
SL1 4BA
(0753) 33404

Javelin Irrigation **Ltd.**,
Hinton Martell,
Wimborne,
Dorset.
(0258) 840495

Evenproducts Ltd.,
Evesham,
Worcs.,
WR11 4TS
(0386) 41212

Perrot Irrigation Ltd.,
38 High Street,
Rowhedge,
Colchester,
Essex, C05 7ET
(0206) 867624

Watkins **Nayler** Ltd.,
Friars Street,
Hereford.
(0432) 274361

Wright Rain Ltd.,
Ringwood, Hampshire, BN24 IPA
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While every effort has been made to include all manufacturers of hose-reel equipment, there are bound to be some omissions. Apologies to those companies not mentioned.

Moisture and the land

Soil texture	Available water holding capacity *(mm/m depth)*	**Infiltration** rate *(mm/h)*
Sand **Sand/loamy** sand	*80* *(60 — 100)*	*50* *(20 — 250)*
Loamy sand Sandy loam	160 *(100* — 200)	*25* (10 — 75)
Fine sandy loam Very fine sandy loam Loam	*210* (190 — *250)*	*12* *(7 — 20)*
Silt **loam**	*240* *(150 — 280)*	10 *(5* — 15)
Clay loam Sandy clay **loam** Silty clay **loam**	150 *(130 — 190)*	*7* *(2* — 15)
Clay	*170* *(130* — *180)*	*S* (1 — 10)

Note:
Figures in **brackets** indicate the range of values. These values must be used as a guide only and whenever possible field measurements should be made.

Source: Institution of Agricultural Engineers Data Manual. **Ref 1084:78.**

Crop **response** to a moisture deficit at different **stages** of growth.
This table lists the growth stages at which a plant is **particular** sensitive, in terms of final yield, to soil moisture stress. In areas where water supplies are limited, best use can be made of the water, by irrigating during these sensitive periods.

Crap	Moisture sensitive period
Beans, broad	Flowering, pod swelling.
field	Flowering, pod swelling.
runner	Flowering onwards.
Cabbage	Throughout season, but especially at heading.
Carrots	Throughout season.
Cauliflower and broccoli	Throughout season, but especially at early stages of curd-development.
Cereals	Flowering, grain swelling.
Lettuce	Throughout season.
Onions	Throughout season.
Peas	Flowering, pod swelling.
Potatoes, early	Marbling stage.
maincrop	Throughout season.
Strawberries	Bud formation, before picking.
Sugar beet	Throughout season.
Tomatoes	Fruit set onwards.

ENERGY

Taking the heat from peat

At some time, most of us have been struck by the simplicity or perhaps the brilliance of an idea. In this article, Brian Lewis, Director of The Big 'O' Filters UK Ltd, describes what could be a major stepping stone towards tapping the earth's natural energy reserves — the Vyrmethane method of extracting methane from peat.

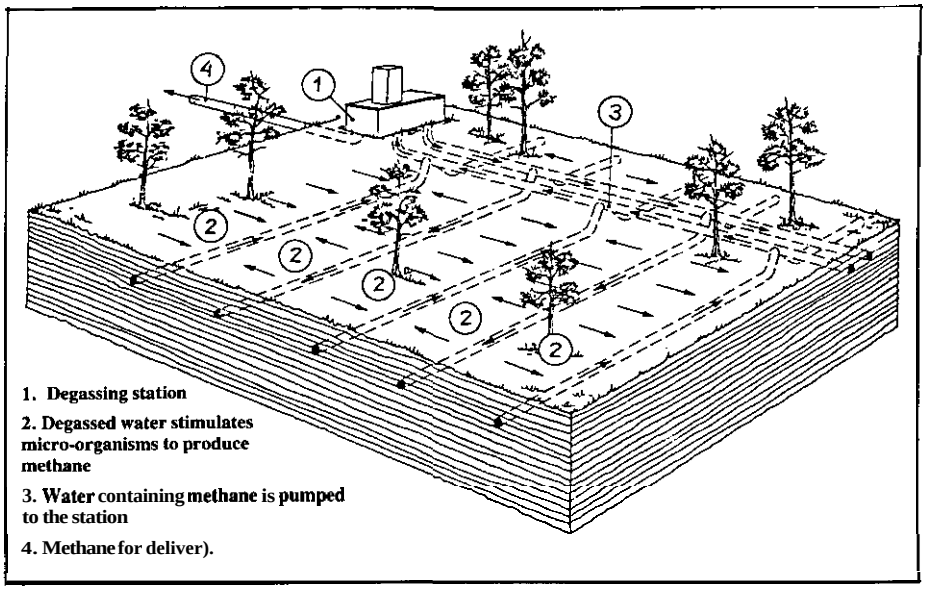
IN RECENT years, Sweden has witnessed an increasing move to exploit the abundance of peat in its vast peat bog areas. In theory, these peat bogs represent sufficient methane energy to replace all Sweden's present oil requirements for the next 100 years. Traditionally, peat is cut and dried before burning, which, after drying, means most of the energy has been dissipated. This is not a modern or effective way to extract the potential heat. By utilising the anaerobic digestion process, ie living or active bacteria in the absence of free oxygen, certain bacteria can be influenced to increase their activity and it is possible to obtain intense methane production.

Near Stockholm, there is a pilot plant which has been in operation since 1978, although preliminary field tests were conducted as far back as 1973. The project was supported by the Swedish Board for Energy Source Development and the pilot plant has been extensively monitored to establish how effectively peat can be converted into methane gas directly in the bog itself. The results have proved that methane gas can be extracted from the bog for twelve months of the year.

The activity of the anaerobic bacteria in the peat produces methane which dissolves in water. The methane-enriched water is then pumped to a degassing station above ground, where the methane is separated by a vacuum process. The water is then recycled underground and more methane is picked up. A Vyrmehane plant consists of water supply drainage pipes or wells, a degassing unit and recirculation drainage pipes or wells.

The supply and recirculation pipes are standard agricultural plastic land drainage pipes which are installed in water-hearing peat layers. In future, two or three drainage pipes will be laid on top of each other to increase the water supply to the degassing station. At the pilot plant the supply wells are vertical. The wells penetrate the peat to between 0.5 metres and 3 metres deep, therefore the pumped water is a mixture of water from different layers, including the top layer which produces very little methane.

All supply and recirculation pipes are filter wrapped to prevent peat particles entering the pipework system. Vertical wells need to be joined together using a manifold or gallery pipe. The gallery pipework is usually above ground, but for the tidy-minded there is no reason why it could not be underground.



Typical layout of a Vyrmerhaneplant

Apart from the degassing station and possibly the well galleries, the surface of the bog remains intact. In the long run the structure of the underlying peat will gradually change in line with the reduction of solid matter.

Performance

The acreage required for a 100 litre per second unit depends on the thickness of the peat and the hydraulic conditions. However, it is likely to be between 2 and 4 hectares (5 and 10 acres). Calculating methane collection with a unit capable of a throughput of 100 litres of water per second, the electric power consumption of a 100 litres per second plant will be a gross 35 kilowatts. This effect corresponds to 700 mgs of methane per second, as the heat value of methane is 50 joules a milligram. In turn, this corresponds to 7 mgs of methane per litre of water at the 100 litre per second plant.

Thus, if the degassing of the methane is 20 mgs per litre of circulating water, the nett production that can be delivered is 13 mgs per litre. This equates to an annual delivery of methane from a 100 litres per second unit of 41 tonnes a year. Figures produced in Sweden have shown that the plant can pay for itself and start producing a profit after five years operation.

The basic advantages of the Vyrmethane method over traditional peat exploitation methods are:

- Lower transportation, handling and operating costs.
- Small areas of peat can be exploited economically with the Vyrmethane method.
- There is little damage to the landscape, hydrology or the animal and plant life around the peat bog. Traditional peat winning changes the landscape considerably.
- The environmental pollution when burning methane fuel is comparatively small.

In the search for alternative energy sources, patented Vyrmethane CH, extraction is probably one of the most exciting natural energy recovery methods and should not be disregarded. For owners of peat lands; for users of energy and for the conservationsists struggling to preserve our heritage, Vyrmethane is probably the best method of producing a fuel which is beneficial socially and economically. Until fully exploited, the gas will continue to rise out of decaying matter and will simply go to waste.

Further information can *be obtained from the author at Birchfield Road, Redditch, Worcs, B97 4LX, or telephone 0527 4502646.*

Think before you cross the road,,,

In compactable soil, the Impact "Mole" produces accurate bores with minimal deviation from the required course. Its low weight and straightforward operation allow one-man working, saving you money, and its versatility, trouble-free design and high working speed cut your costs still further.

HOW IT WORKS

The Impact Mole is driven by compressed air at 6 kg/cm^2 (85 psi). A striker, reciprocating inside the Impact Mole, hits the inner face of the front of the body and pushes it forward, creating the bore. Friction between the body surfaces and the surrounding soil prevents the Mole running backwards. If it encounters an impenetrable obstruction, the striker can be reversed, extracting the Mole from the bore quickly and effortlessly.

2 IN. TO 32 IN. DIAMETER

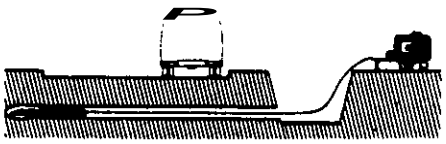
APPLICATIONS

The Impact Mole is designed to punch horizontal, inclined or vertical bores (dead-end or through) in compactable, non-rocky soils. Because of its trenchless operation, it allows telephone and power cables, pipelines, etc., to be laid under existing surface structures and installations (such as roads, railways, airport runways, banks, dams and Industrial or residential buildings).

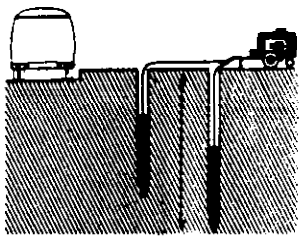
In addition, the Impact Mole can be used for installing earthing circuit electrodes, driving in or extracting pipes, sinking wells and other dead-end shafts (for blastino work, drainage, etc.), inter-tunnel bores and for loosening consolidated materials.

Impact 'Mole'

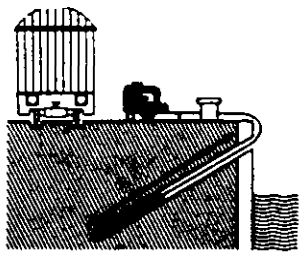
Some of the many applications of the Impact "Mole"



Horizontal boring for service ducts, cables, drainage, etc. up to 800mm in diameter.



Vertical boring for formation of sheet piling, posts, geological surveys, etc.



Inclined boring for ground anchors, land stabilisation, etc.

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VII-2

SOIL PROFILE

The company that Jack built

A profile of Wright Rain Ltd

IT IS OFTEN said that necessity is the mother of invention and this was certainly so in the case of Wright Rain Ltd. From its humble beginnings at a small farm tucked away close to Ringwood, in Hampshire, the company is now Britain's largest manufacturer of irrigation equipment, with products in use all over the world.

All this because the late Mr C. S. (better known as "Jack") Wright, who was farming at Crowe in Ringwood, could not find the irrigation equipment he wanted — so he developed his own!

The range of sprinkler irrigation equipment he designed proved so successful on his own farm–that he decided to enter into manufacturing on a commercial scale, and on 26 February 1953, Wright Rain Limited was formed as a private limited company.

Before his tragic death in 1965, in a flying accident while visiting an irrigation installation in Africa, Jack Wright saw his enterprise develop into an international organisation, manufacturing and selling the world's most comprehensive range of irrigation equipment. During those first thirteen years many notable achievements had been recorded, including the winning of the Burke Challenge Trophy awarded bv the Royal Agricultural Society of England just one year after the company had been formed.

Many farmers, sceptical about the value of irrigation, were convinced of its benefits during the early part of the 1980 growing season, when Britain experienced one of its driest springs on record. This, linked with the progressive interest in irrigation techniques, led to Wright Rain enjoying a very productive year and this success continued through '81 and '82 and order books are already well filled for the coming season.

Wright Rain has always been aware of the tremendous potential in world export markets and as early as 1956 the company brought together farmers, distributors, and Government officials from 20 countries to an Irrigation Symposium in Bournemouth. The programme included the largest demonstration of irrigation equipment ever held in this country. The export exchievements of Wright Rain were officially recognised in 1967 when the Company won the Queen's Award for Industry. Today, the export drive continues with Wright Rain products being sold throughout the world.

By 1960, the Company had outgrown its original site, whereupon it literally moved 'across the road' to its present site where, apart from offices, assembly and tool production, a foundry and an extensive research and development unit are also located. More recent achievements in Wright Rain's progress include the Gold Medal from the Royal Agricultural Society in 1970 and the Royal Warrant of Appointment to Her Majesty the Queen as Manufacturers of Irrigation Equipment in 1973.

Resources

Since joining the Birmid Qualcast group in 1966, Wright Rain has benefited from the Group's financial and manufacturing resources, which have contributed a great deal to development.

In the 30 years they have been in business, they have progressed from manufacturing simple aluminium pipe-based sprinkler systems, used also for frost protection, to the production of a range of diesel, electric or tractor-driven pumps, and the sophisticated series of Touraine and Super Touraine semi-automatic hose-drum irrigation machines.

Wright Rain also provides a scheme design service which will give advice on the most suitable system matched to crop, soil and terrain conditions. Once in operation each system is backed by the company's comprehensive parts and service facility.

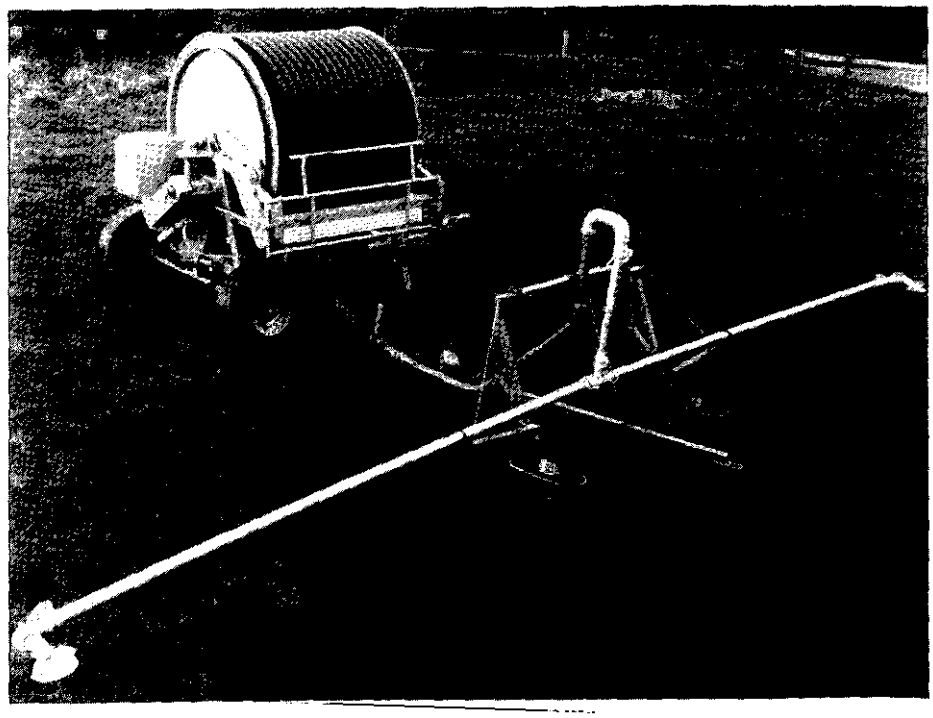
As a result of the growing interest shown in their range of water and waste handling products and the subsequent developments and expansion of the choice of equipment they offer, the company has now formed a division to concentrate on promoting sales to industry under the Farrow banner.

The company manufacturers a wide range of water and waste handling equipment designed for use in many industrial markets. For example, clear water and sludge/slurry pumps able to handle many industrial and local authority effluents and wastes.

Sludge tankers, injectors, dispersal equipment, liquid waste transfer vessels, separators, aerators, mixer and conditioner pumps and a range of aluminium tube, produced on the company's own mill, are also of interest to such industries as power, chemical, brewing, food processing, construction, mining, quarrying, plant hire and to local authorities. Products for dust suppression and leachate control are also available.

There is no doubt that the Wright Rain/Farrow organisation prides itself on its progressive nature and is constantly, looking for ways of improving the performance, quality and range of its products and services to both agriculture and industry.

Wright Rain's latest hose drum irrigation machine, the Mark 2 "SuperTouraine"



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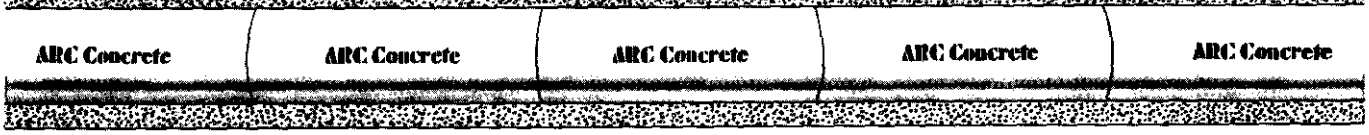

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Cultivating weed research

SAWMA's Annual General Meeting provided an excellent opportunity for soil managers to meet the 'weed men' of the WRO. Since its formation in 1960, the Weed Research Organisation has, in the opinion of SAWMA President Sir Nigel Strutt, built an excellent reputation. Indeed the papers presented and discussions led by Mr Jimmy Elliott, Head of the Weed Control Department, were of high quality and provided ample information for those farmers trying to "bankrupt the soils bank of weed seeds". Mike Saull reports:

WEED RESPONSES TO CULTIVATIONS

Mr Dick Chancellor, Head of the Weed Biology Group, told the SAWMA audience that of the 1500 species of plants present in this country 10 per cent were weeds. Indeed, WRO work indicates that in every square metre of arable soil there are between 3 and 555 weed seeds. Cultivation plays a very important part in the distribution of the seeds throughout the soil profile. In the top 2.5 cm of soil after direct drilling, one can expect that 90 out of 100 weed seeds shed on the surface will remain in this layer. With a plough working efficiently, the number at the same depth can be as low as 3 per cent — with the majority distributed between 9 5 to 13 cm depth. Tined cultivation can be quite effective at removing seeds from the 2.5 cm zone — with only 40 per cent remaining after cultivation.

Indeed Mr Chancellor recommended stubble cultivation as an effective surface cleaning operation. Continuous loosening may not be the answer to weed control as seeds are continually brought to the top.

HERBICIDE ACTIVITY

Six reasons for the apparent poor activity of soil-acting herbicides were given by Annual Crops group worker, Mr Steve Moss:

- The moisture content of the soil, with cultivation affecting the water-holding characteristics of the surface soil and herbicide activity.
- Formation of cloddy seedbeds which can reduce the action of blackgrass herbicides.
- Poor application.
- Insufficient time allowed for the effect of herbicides to have been observed.
- Farmers' expectation of the action of herbicides is often too high. Direct drilling can give six times the occurrence of blackgrass compared with ploughing. Herbicide usage in some instances should mirror cultivation practice.
- Soil organic matter levels too high. Adsorption of herbicides in soils

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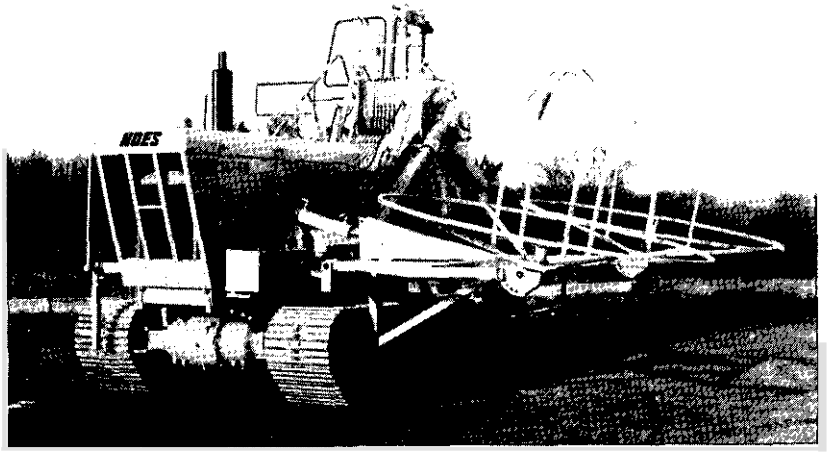

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d cab. Pipe y Pipe reel.

SUPERDRAINER 567/130H

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Trench depth 1.75m

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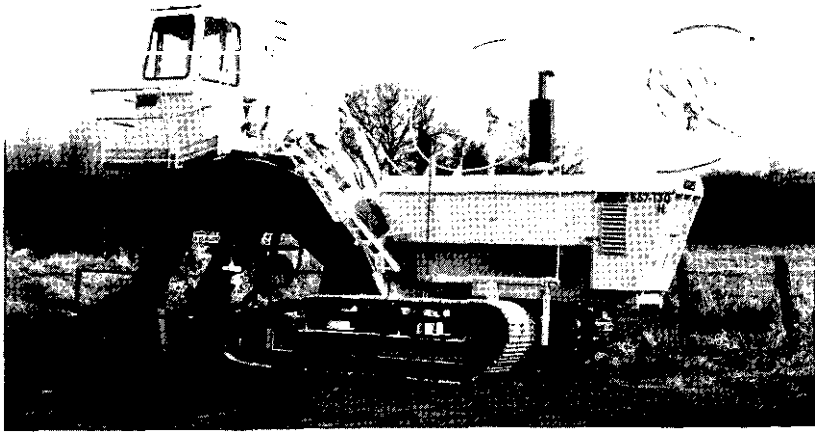

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with a high organic matter decreases their efficiency.

ASH & STRAW RESIDUE

Mr Moss explained that straw hurning in minimum cultivation and direct drilling situations could lead to a marked increase in ash in the top 2½ cm of the topsoil. Organic matter contents of this zone can be as high as 5.1 per cent in direct-drilled soils and 3.0 per cent in ploughed. Although this will have a beneficial effect structurally, research had shown that soil-acting herhicide activity can be significantly reduced in direct-drilled soils.

Solutions to this effect might include the use of foliar-acting herbicides, the application of herbicides, post rather than pre-emergence and the use of rotational ploughing in direct-drilled situations to bury the adsorptive surface soil layers and remove weed seeds to depth.

If straw hurning is banned, then the problem of a highly adsorptive surface layers will not disappear, because, as Mr Moss concluded, straw residues are also able to render a herbicide activity partially ineffective.

THE AGRONOMIST'S DREAM

Mr George Cussans, head of the Annual Crops group, considered that we are a very long way from manufacturing an effective soil-acting herhicide that will cause complete kill of all weed species. It is, he said, very difficult to get sterilants into the soil and the same applies to herbicides; furthermore, even if we do get to the stage where a blanket kill can be achieved a new tolerant weed would probably rear its ugly head and we would be hack to square one.

Research by the WRO's Annual Crops group indicates that herbicides need to be particularly effective to control hlack-grass. The annual percentage kill needed by herbicides to maintain a static hlack-grass population varies greatly with cultivation and method of straw residue disposal. For example, when straw is not burnt 65 per cent kill is needed on ploughed land whereas when direct drilling is used 92 per cent kill is necessary. Where straw is burnt, the 'kill' figures needed are 50 per cent and 88 per cent respectively.

STERILE BROME

At present, the control of sterile brome has to he largely cultural, as there is no satisfactory range of herbicides available, said Mr Cussans. Ploughing, if carried out correctly, is the answer to brome which, as a seed, has a very short life, with few lasting longer than twelve months. Minimum cultivation or stubble cultivation can give some degree of control, and as an alternative, he recommended that farmers create a false sterile seedbed and sow late.

Blackgrass in barley. Photograph courtesy of the Weed Research Organisation.

Consolidate on top for high yields on chalk

Chalkland soil management appears at the outset to be very little different from that of the deeper soils encountered more widely in Britain. The Chalklands Cereals Group and ADAS, with the support of SAWMA, set out to examine this specialist situation and, in February, 120 Wessex farmers, met, listened to and talked with the experts at a Salisbury hotel. They learned that although compaction can be a problem at depth, subsoiling as a matter of course can often be a wasted operation. The more obvious difficulty, particularly for those on 'black puff' soils, is a too-loose seedbed, and on occasions it is the tractor wheeling which yields better than the "well structured seedbed". Mike Saull reports from the Chalkland Soil Management Conference.

Geology

Geologically there are three broad chalk-type divisions, the Lower, Middle and Upper. In Wessex, the Upper chalk is the dominant influence on soil type, being the main source of clay-with-flint soils. In valleys, the Middle chalk becomes important forming coombe desposits (a chalk and flint mix).

Mr Mike Jarvis of the Soil Survey of England and Wales outlined the four major soil types of Wessex and provided visitors with an insight to management.

Shallow chalk soils

Three principle shallow soils can be recognised, the 'black puff', Upton and Andover. These soils are well-drained and are usually easy to cultivate. One major problem, particularly with 'black puff soils, is that they are susceptible to frost heave and can produce an under consolidated seedbed with poor germination as a result.

Mr Jarvis pointed out that shallow soils are normally susceptible to drought but chalk soils are the exception to the rule — even in dry seasons. Reasons for this are that roots are able to penetrate into the rubbly material above the bedrock and also that chalk has 15 to 35 percent of its volume as extractable not-drained water. Work at Bridgets EHF indicates that water can move up the profile in the summer and replenishes reserves used by the crop.

Clay-with-flints (clay cap soils)

A soil type which is more extensive in East Hants, but appearing in small patches in Wessex is clay-with-flints. Typical series are Carstens, Batcombe, Winchester and Wallop which are developed in the silty drift or clay-with-flints. Mr Jarvis blessed our "intelligent forefathers" for leaving much of their soils in woodland, because although reasonably well-drained, the soils are naturally acid. Topsoil structure is usually weak and where they have low organic matter content they cap quite easily. Timeliness of operation is critical because these soils have a large retained water capacity and so remain plastic and untrafficable for long periods. Another obstacle to machinery is the high stone content.

Dry valley soils

More restricted in the Wessex region are the deeper drift deposits of the narrow valleys and footslopes. These soils are well drained, and easy to cultivate. though stoniness can be a problem. Rooting depth is variable and soils developed in Coombe deposits can have a compact subsoil.

Wet valley soils

A very wide range of soils ranging from peats to alluvium over gravel. Main features are a high ground water level which is very difficult to improve and humus topsoils which perish easily, thus many are under water meadow management.

Management

With the scene set, two experts from research and one from the local ADAS office looked at tillage and cropping practice.

Mr Dudley Christian from ARC's Letcombe Laboratory recommended early sowing to help create strong root development. In good growing conditions, root depth increases by 5 to 6mm a day during the autumn and winter and accelerates to about 18mm a day in the spring. Most roots, however, are found in the top 25cm of soil but a depth of 200cm may be achieved. Therefore, on shallow chalk soils, depth can be a restriction although a well-structured profile should encourage rooting into the rubbly chalk at depth.

Direct drilling

Research has shown that a comparison between direct drilling and ploughing after the initial few years of work gives little differences in yield. Direct drilling does create a nutrient rich surface layer and roots do tend to concentrate in the topsoil.

Deep loosening expert, Dick Godwin from the National College of Agricultural Engineering, had done his homework to assess tillage machinery and work methods on chalkland. He noted seven main problems associated with cultivations: Shallowness; flints; high wear rates; punctures; pans and dense subsoils; puffiness and loose seedbed conditions and straw disposal.

Recreational Tillage

Two basic fundmentals lay behind Dr Godwins comments. The first was that one should alwavs examine ton soil structure prior to cultivation because chalk is naturally water retentive and if the chalk subsoil is reasonably well structured leave it well alone. Secondly, when attempting to loosen, work from the top down, as this will be far more effective. Dr Godwin considered that a lot of unnecessary work is being undertaken. which could onlv be described as recreational.

Soil loosening

In shallow soils of less than 15cm depth, Dr Godwin thought that shallow ploughing would be an effective soil loosener, if one was required. In medium depth soils, most fanners were looking to achieve a smooth undisturbed surface, particularly if they are direct drilling or using minimum cultivations. The best ▶

machines for this are those with a low lift height, with narrow points and wings, or the side-inclined Paraplow. In deeper soils or when a cloddy finish is not a problem, more conventional designs are effective for tillage.

Seedbed compaction

If the problem at depth is compaction, quite often the reverse is true in the seedbed. Dr Godwin's solution in this case is to work from the bottom up, using machines with a "backward rake" which bite into the soil, for example discs, spiral and furrow presses.

Mr Andy Wharton, ADAS soil scientist from Bristol, provided plenty of evidence of low consolidation. With very loose seedbeds, he pointed out that the direction of drilling (ie uphill then downhill) would lead to different depths of seed placement giving uneven crop emergence. One big hazard on chalkland soils is infield variability. Changes of soil texture and depth within a field that is cultivated as one unit can result in soil structural problems. A good example is compaction on a heavy soil cultivated too wet, or puffiness if a light textured soil is cultivated too dry. This is seen when clay-with-flints meets 'black puff' soil.

In conclusion, Mr Wharton re-emphasized the point that soil examination is a most necessary requirement before cultivating and that cultivations should be flexible and meet the requirements of both soil and crop.

Solving soil problems

As a Reading graduate and son of Bristol's ADAS Regional Soil Scientist, Mr Peter Russell is one farm manager who should have more knowledge than most when it comes to soil management, though as he pointed out it is not always so easy to put into practice with the elments against you. Farming between Marlborough and the M4, Mr Russell has moved away from grass to predominantly winter cereals cropping.

In the past, cereals were combine drilled, but now they have returned to plain grain drilling which has increased his daily drill output and done away with a slow operation in deteriorating autumn conditions. All compound fertilizer is now broadcast as soon after harvest as possible, occasionally even before straw is burnt, making use of the previous year's tramlines. He is quite happy to plough compound fertilizer in, and feels this may even improve the general distribution of nutrients, especially phosphate, through the soil profile.

Acidity was found to be a particular problem on clay-on-flint soils and to combat this Mr Russell applied 8 tons an acre on one field over a four year period, to raise the pH from 4 to 6.8. He now carries a simple pH kit with him when on the farm.

Also in the car is a spade which proved invaluable when he started as farm manager and noted compaction on many fields. Mr Russell attributed the gradual deterioration of soil structure to late ploughing, the increase in machinery size and a perhaps naive assumption that clay-with-flint soils were as inherently well-structured as shallow chalk soils. Since 1977 he has hardly used a plough and relies on minimum tillage, using a pan buster when conditions dictate.

Conclusions

It is apparent then that chalk soil management is a different 'kettle of fish' from the heavy clay of Essex, or the sands of the Vale of York. The main problem must be the range of soil variability that can be encountered within one field boundary. Chalkland soils usually have a stable structured subsoil, so the message must be to leave well alone, unless compaction is evident. Consolidation of the seedbed is, however, another matter, particularly on the "puffier" soils.

I got the impression listening to the speakers and questions from the floor, that farmers would be wise to have a wide and varied choice of cultivation implements at their disposal to best manage chalk soils.

VII-2

SURVEYED

Putting us on the map

THE SOIL Survey of England and Wales produces detailed maps which show the distribution of varying soil types throughout the two countries. Formally recognised in 1939, and with headquarters at Rothamsted Experimental Station, Harpenden, Herts, the Soil Survey now operates 17 regional offices throughout England and Wales.

This article is based on information provided by Dr Bob Evans, Cambridge-based information officer for the organisation, describing the Soil Survey's national mapping programme.

LAST month, soil maps covering the six Ministry of Agriculture regions were published by the Soil Survey of England and Wales. This 'national set' means that, for the first time, there is good quality information on soil type distribution throughout both countries covered by the Survey.

From 1946 to 1977, about 15,000 sq km had been mapped and published at a scale of 1:63,360 (1in:1 mile) and from 1966, a further 13,000 sq km had been examined and is, or will be, published at 1:25,000 scale.

By 1979, there were still large blocks of land in England and Wales which the Soil Survey had not visited. Questions about the soil type and profile were often difficult to answer despite the availability of geology maps. These, used with discretion, give some useful information but do little to aid soil identification where drift has occurred.

For these reasons, the Soil Survey initiated its National Map programme in 1979, aiming to visit and plot at reconnaissance level those localities not previously mapped.

Field work for the national programme was based on the 10 sq km (1:25,000) Ordnance Survey maps. About ten days were spent on each sheet, with surveyors drilling about 200 auger bores in selected localities and around four points where small pits were excavated.

Each auger bore and pit was assessed by the Survey's standard method and all information stored on computer. By combing field data, geology maps and details obtained from aerial photographs, lines were drawn up describing the soil Associations.

Each Association contains a restricted soil range, found in recurring patterns on the landscape related to relief and parent material changes. Boundaries on the maps are defined not only by different soils but by changes in land form and rock types. Six regional maps covering all of England and Wales have now been published at a scale of 1:250,000 (¼in:1 mile) and bulletins describing the soils and their characteristics will follow next year. Funding for the project came from the Ministry of Agriculture, Fisheries and Food.

The production. of a National Map brings a number of immediate benefits. It provides a better basis for teaching agriculture, soil science and geography while giving the country more knowledge about its soil resources. In addition, information is now at hand that will help those responsible for preserving, protecting and using those resources. Previously, the detail was either too imprecise or simply not available.

This new information on the distribution of soils suggests that some problems related to agricultural productivity and modern agricultural practices may be more widespread than is generally realised. The growth and yield of crops, regardless of inputs, can be inherently limited by soil factors, for example, inadequate rooting depth. The variability of crop growth is often seen clearly on air photos used for mapping, and evidence

Aerialphotograph taken at Huntingfield, Suffolk in May 1981 shows water erosion of fine loamy and clayey soils over chalky Boulder Clay.

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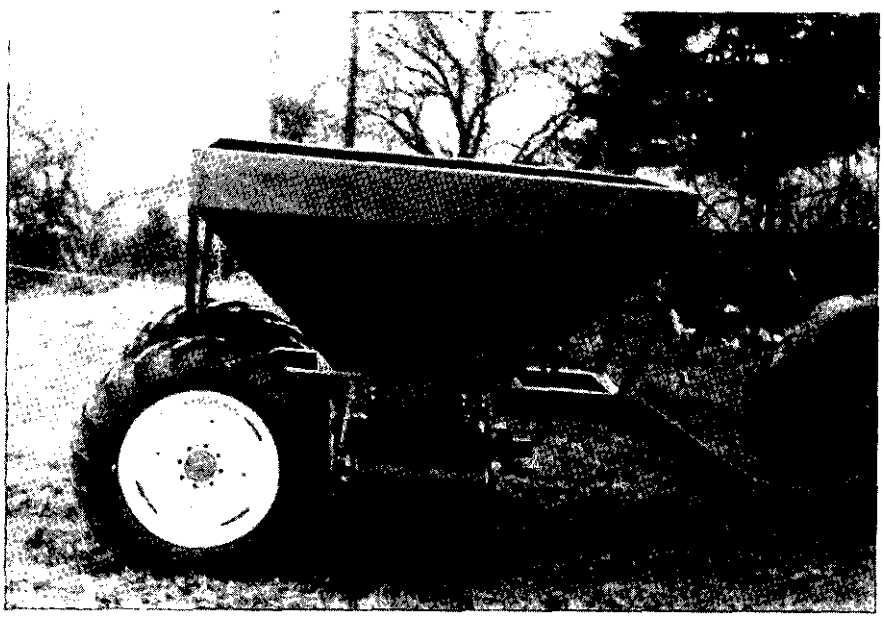

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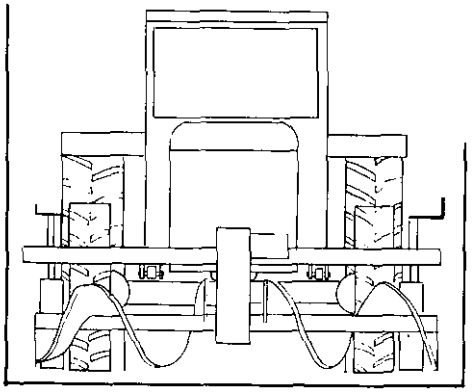

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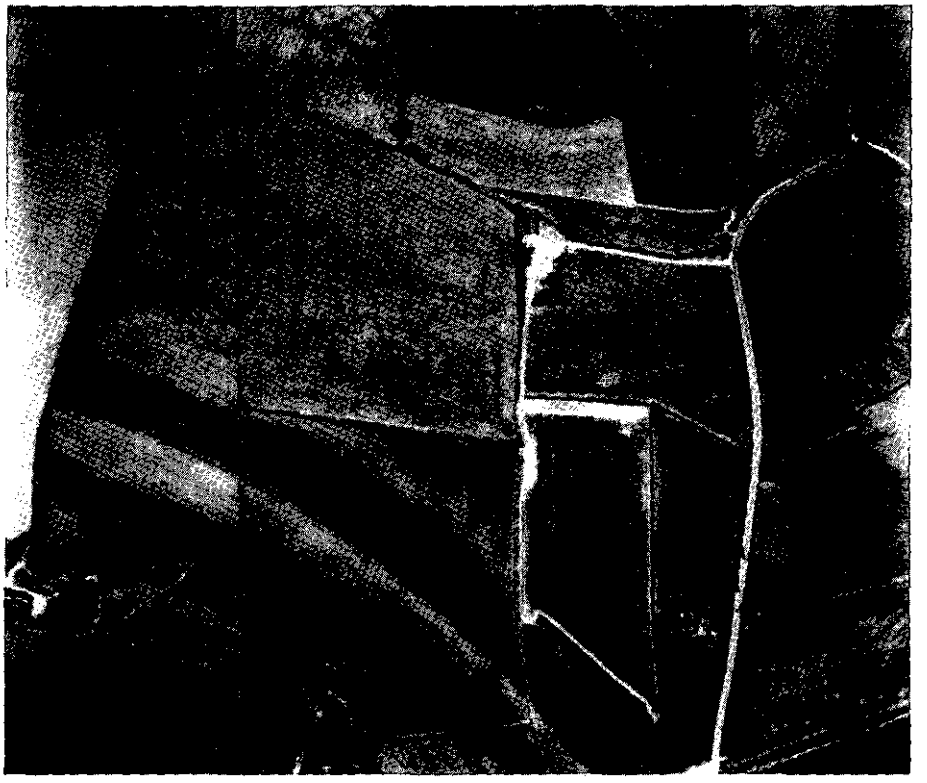
from the photos and the National Map suggests that crop patterns are widespread in arable England and Wales.

Water erosion is also clearly seen on air photos, and although the occurrence of erosion is primarily related to the form of the land rather than soil type, it is more severe on sandy and coarse loamy soils than it is on clayey soils. The areas particularly at risk can now be more accurately defined, and are not small.

The National Map should stimulate interest in soils, and ensure more informed appraisals of the soil factors affecting agricultural production. In future editions of Soil and Water such relationships with the soil map will be expanded.

Many people may not know if their farm has been mapped, so why not contact your nearest Soil Survey office? Each regional office holds copies of *the* original field sheets for inspection and surveyors are ready to help with enquiries.

There is no doubt that the maps, and bulletins when published, will be of great help to drainage engineers, contractors, farmers, hydrologists, planners and conservationists throughout the country.



ADAS Aerial Photography **Unit:** *Crown* **copyright.**
Growth patterns in *winter wheat,* Helpston, Cambridgeshire, July 1976. Dark tones: *taller,* better yielding plants over deep clayey soils; *light tones:* poorer crops in shallow soils over limestone.

Soil Survey regional offices and contacts

Northern region

Mr R. A. Jarvis, Soil Survey of England and Wales, Block 7. Government Buildings, St George's Road, Harrogate, North Yorkshire, HG2 9ER.

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Principality of Wales

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Mr W. Lea, Soil Survey of England and Wales, Shire Hall, Mold, Clwyd, CH7 6NG.

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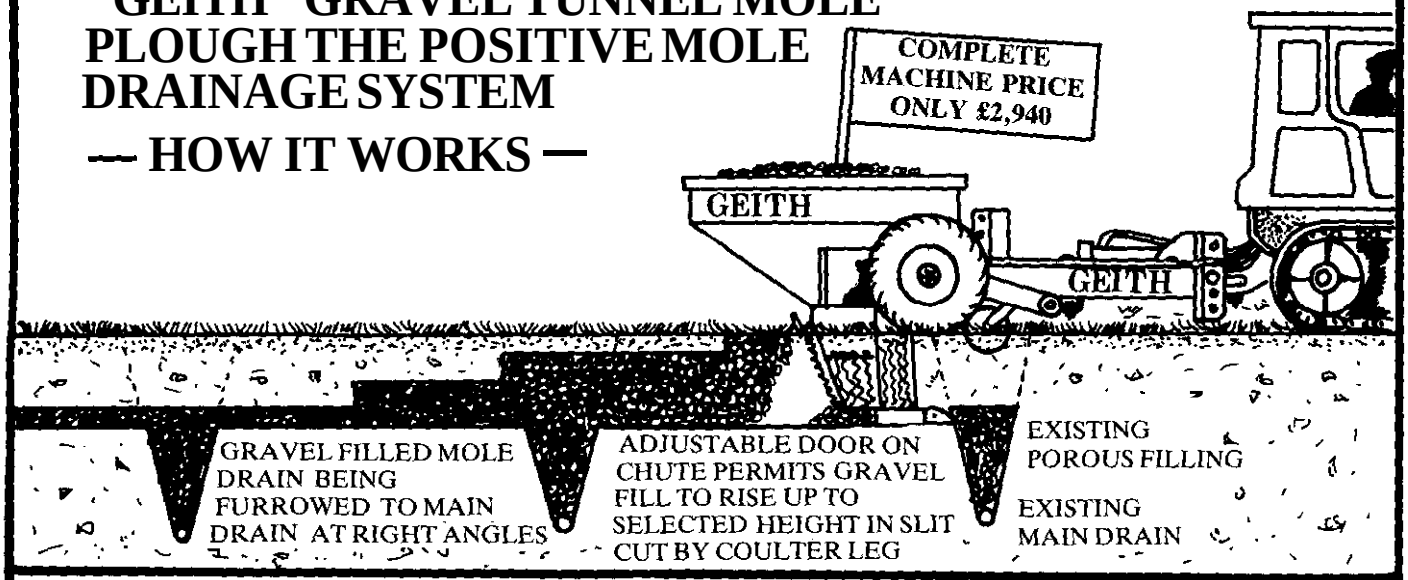

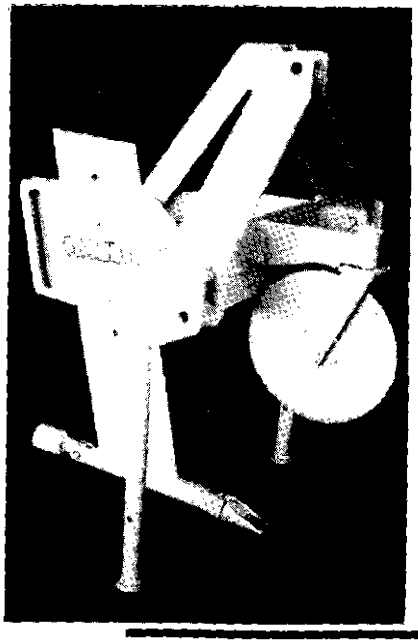

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18-21 Basic Surveying Short Course — NCAE (contact Pam Cook 0525 60428)

MAY

18-19 Shropshire & West Midlands Show — including 'Good Earth' marquee

26 F.W. International Drainage Event — Alnwick, Northumberland.

JUNE

15–16 Wheat **'83,** Cambridge — Organised by RASE.

22 Irrigation demonstration. Bedfordshire — Further information from Mr P. C. Rickard. MAFF Office. Cambridge. Tel 0203 358911.

JULY

4–7 Royal Show, NAC. Stoneleigh. Kenilworth.

4–8 Bilogical Processes and Soil Fertility — ISSS and BSSS Meeting. Reading University.

SEPTEMBER

7–8 **Autumn** Cultivations Demonstration — RASE — ADAS — SAWMA at NAC. Stoneleigh.

15–16 Land Restoration course, **Wolfson** College. Cambridge — Details from Mr N. A. Duncan, telephone 0954 60888.

APRIL **1984**

1-5 A.G. ENG '84 — International Conference to celebrate NIAE Diamond Jubilee.

EASTER (dates to be confirmed)

Land Capability and Education in Soil Science — BSSS residential meeting. London.

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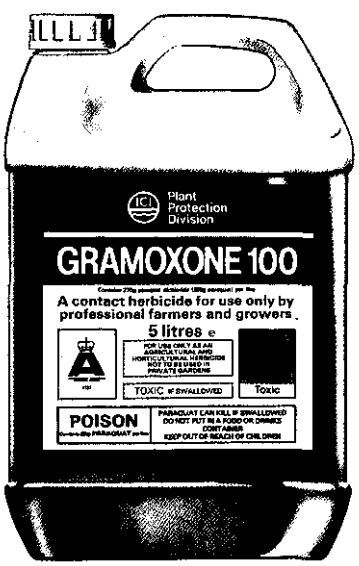

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