THE MORLEY
AGRICULTURAL FOUNDATION
&
MORLEY FARMS LIMITED

2019

The Morley Agricultural Foundation and Morley Farms and Trials

Summary of our Activities

Summary of our Activities 2019

Morley Business Centre
Deopham Road
Morley
Wymondham
NR18 9DF
Tel: 01953 859630
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Registered charity No.
1097177

The Morley Agricultural Foundation

The Morley Agricultural Foundation (TMAF) is a charity which hosts and facilitates agricultural research and education – much of it on our own farm. The research itself is carried out by a number of other bodies, principal among whom is the National Institute of Agricultural Botany (NIAB).

Agricultural research priorities have moved to sustainability and environmental issues of late with less emphasis on 'which' type trials of agrochemicals, fertilisers and seeds, important to farmers though they still are. This changed scenario prompted directors to review the unique strengths of TMAF which include the following:

- Strong commercial farming interest with good contacts with farmers in East Anglia.
- Long term land holding with experimental data going back many years and the almost unique ability to commit to medium and long term trials for the future.
- Ample space to accommodate a range of trials, including some at field scale, with more than one trial partner, and facilities to demonstrate practical outcomes on site (including lecture facilities).
- Proximity to the higher science and bio technology presence on the Norwich Science Park and the University of East Anglia (UEA), together with close association with Easton and Otley College.

Examples of the kind of research the Directors are keen to support through grants, particularly if carried out on the Morley farm, are outlined further on in this booklet.

At the same time, Directors would like to diversify their grant support to include a greater proportion (perhaps 25%) to agri-food education, and to work more closely with other charities to achieve measurable outcomes in terms of improved career structures, increased student numbers and better appreciation of the role of agriculture. Examples of education and improving public information grants given in the past few years are supporting Easton and Otley College, supporting the show associations, Open Farm Sunday, part funding PhD students, schools visits to the farm and the Farming is Magic videos.

Morley Farms Ltd

Morley Farms Ltd. is the commercial farming arm of The Morley Agricultural Foundation. The company farms over 720ha (1800ac) although only 660ha is currently cropped with the remainder being permanent pasture, woodland and tracks. The land farmed is on several holdings with the furthest being 10 miles away.

Summary of land cropped by Morley Farms

Farm	Tenure	Ha
Manor Farm, Morley	Rented from TMAF	392
Burfield Hall, Wymondham	Rented from TMAF	82
Dyke Beck Farm, Wymondham	Rented from TMAF	62
Church Farm, Bawburgh	Rented from John Innes Centre	132
Total		668

Crops grown include winter wheat, winter malting barley, sugar beet, spring malting barley, oil seed rape and dry peas. The soil on the farm varies from field to field but will support the crops mentioned above. The soil is typically classified grade 2 or 3 and ranges from 'Ashley series' light - sandy loam to 'Beccles series' medium - sandy clay loam.

With careful planning the soil supports sugar beet well, achieving good yields and giving flexibility to be lifted throughout the campaign. Sugar beet has been the most profitable crop, but does impinge on other crops through damaged soil structure and the need to follow a percentage of the beet with spring barley, which often gives modest returns.

Crop	Typical Yield
Winter Wheat	10t/ha
Winter Barley	7t/ha
Spring Barley	6.5t/ha
Sugar Beet	82t/ha
OSR	4t/ha
Beans	5t/ha
Dry Peas	4t/ha

Morley Farms' links with John Innes Centre

The land farmed at Church Farm, Bawburgh is owned by the John Innes Centre and let to Morley Farms on a farm business tenancy (FBT).

This farm has a wide range of soil types often in the same field. JIC carryout their outdoor trials program on the more consistent land. The trials are mostly wheat and cover about 8 - 10ha. JIC require 1st wheat trials every 3 years, and a rotation is chosen to fit in to the trials programme.

Cropping rotation

The rotation is not fixed but changes slightly to accommodate trials etc. There are some golden rules however when deciding the next years cropping.

1. Sugar beet is no closer than 1 year in 4.
2. Oilseed rape is no closer than 1 year in 4.
3. Maximise the area of 1st wheat.
4. Where possible fields are blocked together, e.g. all the bean fields are next to each other to ease management.
5. The areas of each crop are matched to the storage facilities.

Each year it is important to have a balance of crop areas to spread risks and workloads.

Barley and wheat straw is baled to go to three local farms. Pig and cattle manure returns to the farm free of charge. About 2000t FYM is spread before the sugar beet crop. Poultry manure is also purchased and used before OSR crops.

Crop storage

Manor Farm has various grain stores, which include 3600t of capacity on floor drying buildings. There is a further 500t capacity of on floor storage. The recent investment in grain storage has helped to future-proof the farm by having grain storage that will meet future grain storage food safety requirements and gives the farm more flexibility in marketing.

Markets

Crop	
Sugar Beet	Sugar beet is grown on contract to British Sugar. Morley Farms - 7300t Manor Farm Morley is 25 miles from the Cantley sugar factory.
Wheat	Grown for feed and sold through merchants to local markets for livestock rations for chickens, turkeys and pigs. An alternative market is export, as we are not far from sea port and each year a percentage is exported.
Winter and spring barley	The goal is to produce malting quality barley that is sold through merchants to local maltsters that supply the brewing and distilling industry. There are 3 major and several minor maltings in East Anglia.
Oil Seed Rape	OSR is sold to local merchants and is either delivered direct to the oil crusher at Erith, Kent or delivered to a central store to be processed later in the year.
Dry Peas	Targeted at human consumption market.

Staff

There are 3 full time staff: a working manager and 2 machine operators. This is supplemented by ad hoc casual staff at harvest.

Straw baling and sugar beet harvesting is done by local contractors.

Machinery

Machine	Size	Age
Combine Lexion 570TT	7.5m header	2009
John Deere 7310	300hp	2016
New Holland T 7210	165hp	2011
Massey Ferguson 7495	200hp	2009
Bateman RB26 sprayer	24m	2015
JCB loader 531		2016

Implements	Manufacturer	Detail
Drill	Vaderstad 400	4m disc coulters
Drill	Accord	4m tine coulters
Drill	Boom bio drill	6m broadcast seed
Drill	Monosem	12 row beet drill with tramlines
Plough	Kvernland	6 furrow variable width
Primary Cultivator	Sumo trio	3m includes OSR drill kit
Primary Cultivator	Vaderstad Opus	4m
Cultivator	Vaderstad NZA	6m spring tine
Cultivator	Kvernland TLG	5m spring tine for sugar beet
Cultivator	Simba Cultipress	5.5m tine and press
Cultivator	Proforge Inverta	6m disc and press
Cultivator	Machio	Power harrow
Subsoiler	Cousins	3 leg
Trailers tipping	1× Warwick, 2× Bailey	14t,18t fitted with floatation tyres
Trailer Flat bead	Richard Western	14t
Water bowser		10000lts
Roller	Twose	7.5m Cambridge roll
Topper	Portagri	3m
Hedge cutter	Shelbourne Reynolds	7m with 1.5m head
Digger	Case	5t 360º

Use of the Farm for Trials and Knowledge Exchange

The farm hosts field trials for NIAB, The John Innes Centre (JIC) and British Beet Research Organisation (BBRO). These organisations manage over 7000 plots. Typically the plots (2m x 12m) are within a field of the same crop. The area occupied by research is about 20ha and is distributed around the farm in smaller lots.

The farm hosts a BBRO demonstration site which includes a collection of closely monitored demonstration plots. The site is available to the industry to visit by invitation of BBRO. Visitors include growers, British Sugar staff, agronomists, students.

The farm hosts a BASF OSR strip trial. This comprises ten plots of 12m × 300m of different varieties some from Bayer and some chosen by TMAF. The plots will be used to make comparisons of disease levels, crop vigour and will also be measured for yield.

As a joint project with Agrovista the farm has programs of strip trials monitoring strip tillage sugar beet with the use of cover crops. Over the years our farm been involved with Agrovista on a range of trials with OSR and barley.

From time to time our farm has been used by other organisation for trials and monitoring including Association of Independent Crop Consultants (AICC), British Trust for Ornithology (BTO) and Easton & Otley College students.

New Heritage Barley Ltd

New Heritage Barley is a science-focussed company that revives old barley varieties both for their own merit and as a source of genetic diversity for the creation of new varieties for the craft brewing industry. The company is a start-up from research originating at the John Innes Centre (JIC) which originally focused on disease resistance in barley landraces, but then investigated the potential for heritage barleys in craft brewing. The Genomics Resources Unit at JIC comprises landraces and early cultivars and is the source of seed with known provenance. One of the varieties that was of interest was Chevallier, first selected in the early 1800s. This variety was found to have very good resistance to Fusarium Head Blight and was also the dominant malting barley in England for nearly 100 years, making it an obvious first choice for re-commercialisation.

Since 2013 Morley Farms has been growing a crop of Chevallier barley for seed. This started as 0.5ha producing 1500kg to growing 7ha producing approximately 25 tonnes. The seed is sold to others locally to produce a malt crop. For 2018 two further old varieties are going to be grown for seed.

Our Commitment to the Countryside

MORLEY FARMS LIMITED

For over 25 years we have actively been creating features and habitats to enhance the wildlife diversity of what would otherwise have been reasonably bland arable farm.

The works has included

- Planting trees in small woodlands and within hedgerows.
- Planting new and gapping hedgerows.
- Establishing 6m grass margins particularly fields adjacent to water courses.

In 2011 a range of new and existing measures were adopted with our successful High Level Scheme (HLS). The main features are as follows.

Capital works

Replacing stock fencing and field gates on our permanent grassland (13ha). This was an opportunity to clean ditches, repair drains and prune back overhanging trees.

Plant 200m of new hedge.

Annual features

6m grass margins.
6m floristically enhanced field margins.
2m beetle bank.
Establish pollen and nectar sources.
Establish seed crops for wild birds annually.
Establish sky lark plots annually.

Ongoing maintenance

Allow hedges to become bigger 1.5 - 2m tall to increase habitats.
Cut hedges in rotation 2 years in 5.
Enhanced ditch maintenance.
Low input grassland.
Maintenance of historical buildings.

Educational access

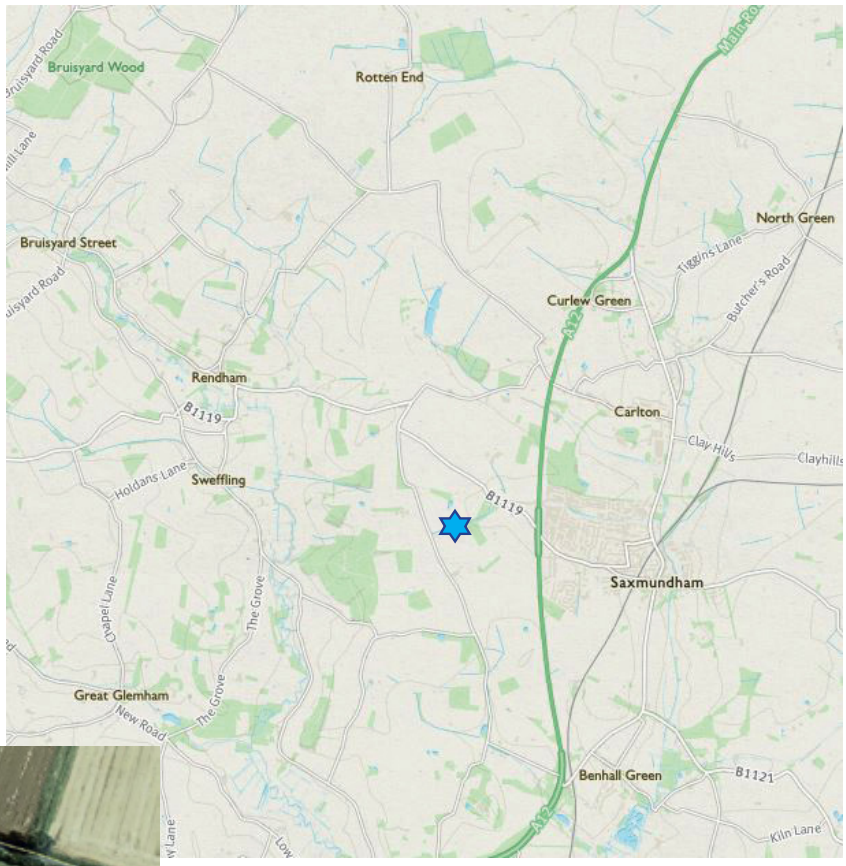
Host 10 visits per year which promote agriculture, the countryside and for visitors who are not farmers.

Saxmundham Long-term Study

In 2013 TMAF agreed to a 20 year lease of a long term trials site at Saxmundham, Suffolk. This 4ha field was set up over one hundred years ago to compare manure and bagged fertiliser use. While there have been some changes to this field trial over the last century the basic study is still in place today.

The initial goal of the work was to demonstrate that farmyard manure was not the Holy Grail of farming and that so called “artificials” (nitrogen (N), phosphorus (P) and potassium (K)) could achieve the same results. This area of debate is still a contentious one today, but perhaps the emphasis is now on what benefit farmyard manures can bring over ‘artificials’!

The study, comparing long term additions of manure, P, K or no input, had been maintained historically through local support, but over recent years the site had fallen out of use. The 20 year security of the site will ensure the value of the site is maintained. The site is managed by NIAB with the support of local growers and agronomists. The field is already proving useful to other research programs to understand the contribution of organic matter to fertility, structure, biology and function of soil.



Saxmundham trials site

TMAF Grant Commitments

THE MORLEY AGRICULTURAL FOUNDATION

Every year TMAF makes grants to many organisations and individuals to support agricultural research and education. Usually financial grants are made but resources are made available e.g. land, machinery, crops as a benefit in kind.

Beneficiary	Start	Commitment	Project	Fund & Resources
NIAB	2016	5 years	New Farming Systems (NFS)	F, R
NIAB	2016	3 years	**M**orley **E**ducatio**n** and **T**raining **O**utreach (MENTOR)	F, R
University Of East Anglia	2017	2 years	Wensum Demonstration Test Catchment - soil, water & crop monitoring	F
Harper Adams University	2018	3 years	Long-term investigation to reduce field traffic intensity	F
AHDB	2017	3 years	Soil and cover crop interaction project	F
British Beet Research Organisation	2017	5 years	INSPiRE- Monitoring spatial crop variation throughout crop rotations	F, R
University of Hertfordshire	2017	1 year	Investigation of insect pathogenic fungi as a pest control agent	F
TMAF	2018	5 years	Morley SAMS – Executed by NIAB	F, R
Agritech East	2016	3 years	Young Innovators Forum	F
Essex Agric. Society	2017	Annual	Essex schools food and farming day	F
Royal Norfolk Ag. Ass.	2017	Annual	Education exhibits at the Royal Norfolk Show and Harfest	F
Suffolk Show Ass.	2017	Annual	School and country fair	F
John Forrest Award	2017	Annual	Communication training with Green Shoots Productions	F
Kevin Hack	2018	2 years	Student bursary - Foundation Degree – Easton & Otley	F
Alexandra Boliver-Brown	2017	2 years	Student bursary - MSc - John Innes Centre	F
Joseph Marthen	2018	3 years	Student Bursary – PhD – Cranfield Uni and NIAB	F
David Leithall	2018	1 year	Student Bursary – Farm Management – Bishop Burton	F
Britany Hazard	2018	1 year	Student Bursary – Quadram Institute	F

NIAB East (Morley) Trials

The Morley Agricultural Foundation hosts numerous field trials for NIAB. The six strong east regional trials team occupy offices at Morley Business Centre and store specialist equipment at the farm. NIAB have approximately 6000 plots managed from the Morley centre, with 1200 being based at the Morley Farm. The majority of work is carried out in 24m^2 drilled plots. The table below shows a summary of the work carried out by the Eastern staff.

Crop	Trial Type	Customer
Wheat	Fungicide	Commercial customers & NIAB TAG membership
	Variety	AHDB, NIAB TAG membership, NIAB pathology & commercial customers
Winter Barley	Fungicide	AHDB, NIAB TAG membership & commercial customers
	Variety	AHDB, NIAB TAG membership & commercial customers
	Fertiliser	NIAB TAG membership & commercial customers
Spring Barley	Variety	AHDB, commercial customers
	Fertiliser	NIAB TAG membership
	Fungicide	NIAB TAG membership & commercial customers
Winter Oilseed Rape	Variety	ADHB, NIAB TAG membership & commercial customers
Sugar Beet	Variety	British Beet Research Organisation (BBRO)
	Fertiliser	NIAB TAG membership
Maize	Variety	British Society of Plant Breeders

NIAB works with a wide range of commercial customers including manufacturers, fertiliser companies, merchants/distributors, breeders and other industry stakeholders.

NIAB trial information is available through a range of routes including open events, training courses, member conferences, publications (e.g. Landmark), trial reports, published papers and through the NIAB website.

Harvesting trials

New Farming Systems, National Agronomy Centres and MENTOR

In 2006 The Morley Agricultural foundation funded and hosted a series of long term projects conducted by NIAB. The work came under the NFS (New Farming Systems) and NAC (National Agronomy Centres). In 2016 further funding was granted for NFS and NAC evolved to become MENTOR **(M**orley **E**ducatio**n** and **T**raining **O**ut**r**each).

NFS		
Study	**Years**	**What It Does**
Cultivation	12	Plough, deep, shallow primary cultivations throughout a crop rotation
Crop rotations	12	Crop rotations with cover and companion plants
Soil amendments	12	Crop rotations with and without green waste compost
Soil amendments	6	Crop rotations with different soil amendments
Soil monitoring	2	Monitoring basic soil qualities where cover crops used

MENTOR		
Straw incorporation	30	Long term soil monitoring when crop residue is incorporated into soil throughout crop rotations
Sugar beet periodic lift	20	Monthly sugar beet harvesting with different fungicide programs
Saxmundham site	118	Compares value of fertiliser v organic manures. See further in this booklet
Cereal disease response monitoring	31	Wheat and barley yield response to fungicides
Student engagement	annual	Making trials site available for under and post graduate students to further extend studies
Conference & workshops	annual	Deliver conferences, open days to disseminate research findings from wide range of projects

These projects have produced findings that have been, and continue to be, presented at numerous events throughout the year including: national and international conferences; open events and workshops; and also scientific papers and printed journals. The results from all the above projects are available on the NIAB website. As the NFS, NAC and MENTOR projects are funded by TMAF the information is available to all.

Demonstration farm

In 2017 Morley Farms became one of six demonstration farms for BBRO. The 3ha site is enabling BBRO to explore the application of new technologies and agronomic practices at commercial scale. New practices that have been tested at the replicated plot scale can be scaled up to whole field level and also acts as test bed for potential future research projects.

For 2019, a number of sugar beet varieties have been grown in 6 rows each across the field, this not only makes a good back drop for open days and field meetings but enables BBRO to make comparisons throughout the season including the storage phase. The aim is to make the site available to growers and agronomist to discuss topics throughout the season.

BBRO scientific site

Morley Farms is also hosting fully replicated trials for BBRO. The field is one of BBRO's regional sites that delivers their experimental programme. The area covers about 4ha of 1.5m × 9m plots. A number of the trials are replicated at other trial sites.

Summary of trials at Morley with BBRO

What the trial is	Who	What
Variety fungicide	BBRO	Investigating if variety yields respond to fungicides. 10 different varieties.
Seed treatment	Syngenta	Evaluating new seed treatment using large-scale equipment.
Seed treatment	Germains	Evaluating new seed treatment using large-scale equipment.
Autumn aphicide	BBRO	Assessing novel aphicide products to control aphids.
Aphicide trial	BBRO	Assessing novel aphicide products to determine reduction of aphids and final yields.
Pellet type trial	Germains	Evaluating different seed pelleting.
Pellet type trial	KWS	Evaluating different seed pelleting.
Virus vs. variety trial	BBRO	Assessing 10 inoculated varieties for BYV and BMYV.

Starting in 2017 TMAF committed to put 25% of its annual funding into new long term projects based on the farm at Morley. It is recognised that TMAF, with its charitable status and substantial land holding, is in a good position to conduct such projects. Despite agriculture being a very long term activity, the majority of research projects tend to be short term (1 to 3 years). The aim is to make part of the farm available to other organisations to conduct long term field based research projects.

Two projects have been insitgated:

INSPiRE INterpreting & managing Spatial Performance in REality

- A partnership between TMAF & BBRO.
- This partnership will monitor spatial field variation in sugar beet crop performance to understand how key factors interact both spatially and temporally and how practical farming management practices such as cover crops, tillage, use of organic amendments and aspects of precision farming such as variable rate applications and cultivations can be used to improve whole field performance.
- Whilst the project will focus on sugar beet, a whole rotational perspective will be adopted, evaluating impacts on other crops and inherent land quality and value.
- It will provide a key platform and resource for areas of more specific research activity and links with other research teams in disciplines such as pest, weed, diseases, soil biology and nutrient management.

Four fields have been chosen, 2 in sugar beet and 2 in wheat in 2018. They will follow a 9 year rotation;

Wheat, sugar beet, spring barley, OSR, wheat, sugar beet, peas, wheat, OSR.

The fields will be monitored to measure their physical, chemical and biological properties. The monitoring will take place at a significant number of locations on each field to establish the extent of variability and reasons for it. The measurements throughout a long rotation makes this a unusual project.

Morley Soil and Agronomy Monitoring Sites (SAMS)

In 2018 TMAF committed to a soil and crop monitoring project 'Morley Soil and Agronomy Monitoring Sites' (Morley SAMS). The majority of the soil and crop research projects in the UK are short-term lasting for 1-3 years. SAMS aims to monitor soil health and its impacts on yield, profitability and resilience at Morley. To build on existing data and experience, thirty 400 m^2 locations are to be sampled and analysed for 5 years, but hopefully this will be extended to 25 years.

It is expected that the information gathered will prove useful to farmers, researchers and scientists, as the weather and politicians influence the way crops are grown. In the future, the information and sites will be made available to 3rd party organisations to add to their knowledge.

A subcommittee from TMAF will lead the project, with NIAB engaged to undertake the work.

Field Scale Research by Morley Farms

Project Partner	Harvest year	Crop	Area	What	Replication	Measured outcomes	Where the information is available
Agrovista/ BBRO	2017 & 2018	Sugar Beet	10ha × 1ha plots	Different cover crops and bare stubble then strip till sugar beet into the standing cover crop	Large part fields. Other UK sites	Yield, crop grow assessments throughout season, compare to other sites	Agrovista publications Agrovista website Annual open meetings BBRO meetings
BASF	2019	OSR	3ha	12m × 300m area of different OSR varieties	Large plot, Other UK Sites	Yield, season long monitoring for vigour	BASF local meetings, BASF website and publications

TMAF & Morley Farms Visitors

Organisation	Year	Group	Contact	Number approx.	What they did
University East Anglia	Annual	Development studies MSc	Philip Richardson	25	Presentations and quick tour of farm
UEA	Annual	Development studies undergraduate	Philip Richardson	25	Presentations and quick tour of farm
Hogent University, Belgum	2018	BSc Agriculture		25	Farm tour discussion of british Agriculture
RMI Analytics, Gemany	2018	Farmers, Maltsters, Brewers	Various	35	Tour of malting Barley crops, presentations
UEA	2018	Trade delegation, Ministry of Food and Agriculture, Turkey		20	Tour of farm
NIAB/TMAF	Annual	Open day, agronomist/farmers	Elizabeth Stockdale	200	Visit field trials and presentations
BBRO	2018	Growers and agronomists	Simon Bowen	150	Tour demo site and crop discussion
Easton & Otley College Several visits	Annual	Foundation Degree Ag BSc Hons Ag Extended dep. Level3	James Trounce Neil Ridley	75	Tour farm, focus on spray loading, grain stores, farm management
Easton & Otley	Annual	Foundation BASIS	James Trounce	10	Farm tour/agronomy discussion
Primary Schools	Annual	Year 2,3,4,5	Various	200	Tour farm English (write newspaper article about farm)/farm maths
NIAB: research visits	Annual	Various students and researchers	Elizabeth Stockdale/ Nathan Morris	20	Research tours typically of farming systems and soils research

TMAF & Morley Farms Visitors

Morley Business Centre has also been used for various meeting and training throughout the year

The above list does not include many speaking engagements by David Jones including Easton & Otley students and supporting LEAF with Open Farm Sunday or other group visits to the farm, NIAB or BBRO that were ‘indoor’ events only.

The visitor engagement program is very much on-going with many events in the planning stages for 2019.

The Morley Agricultural Foundation Finances

The Morley Agricultural Foundation as an organisation has evolved over the years with significant investments made in farm land and buildings. Today TMAF has 2 major income streams; dividends from a portfolio of investments (managed by Barret and Cook, Norwich), and Morley Farms Ltd rents and profits.

Summarised accounts

Income	**Year to 31st August 2018**
Portfolio dividends	266,559.00
Farming income	1,178,690.00
Rented buildings	135,851.00
Other income	6,223.00
Total income	**1,588,407.00**
Expenditure	
Property cost	39,570.00
Administration and governance	20,401.00
Portfolio management fee	16,059.00
Farming expenditure	854,617.00
Grants committed *	286,242.00
Total expenditure	**1,216,889.00**
Surplus	**371,518.00**

** adjustment to audited accounts due to accounting treatment required. Amounts stated in Financial Statement is £463,456.*

Burfield Hall Farm

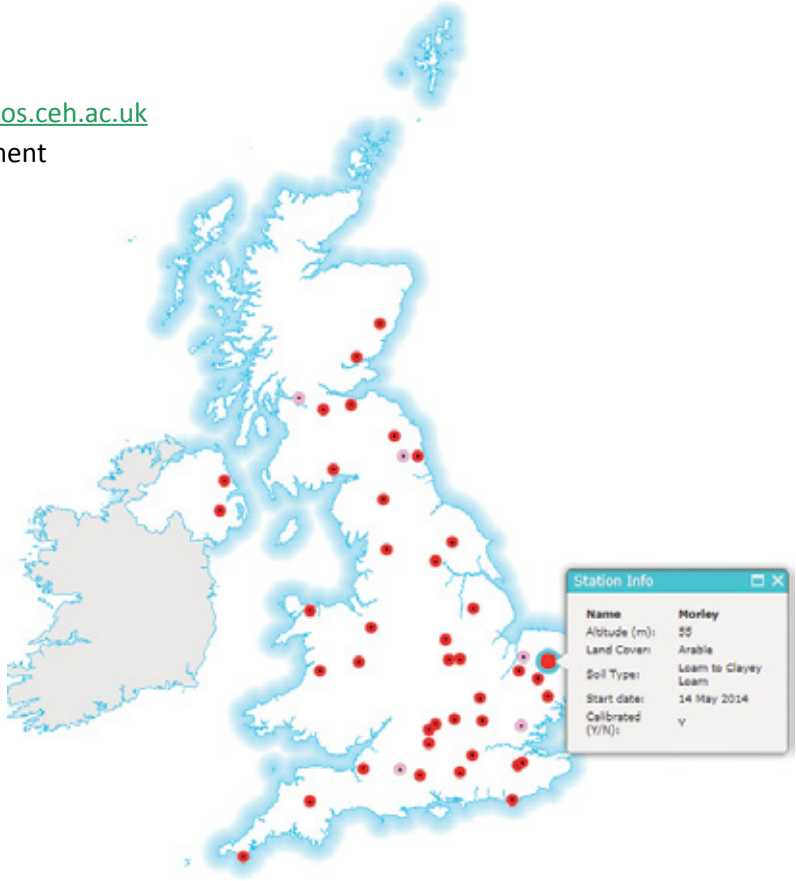
The Morley Agricultural Foundation has a small number of let properties within its portfolio. This includes four local residential properties and 28,000 square feet of commercial storage. Most of the commercial storage is at Burfield Hall Farm near Wymondham which makes use of farm buildings no longer suited to modern agriculture.

Cosmic-ray Soil Moisture Monitoring Network

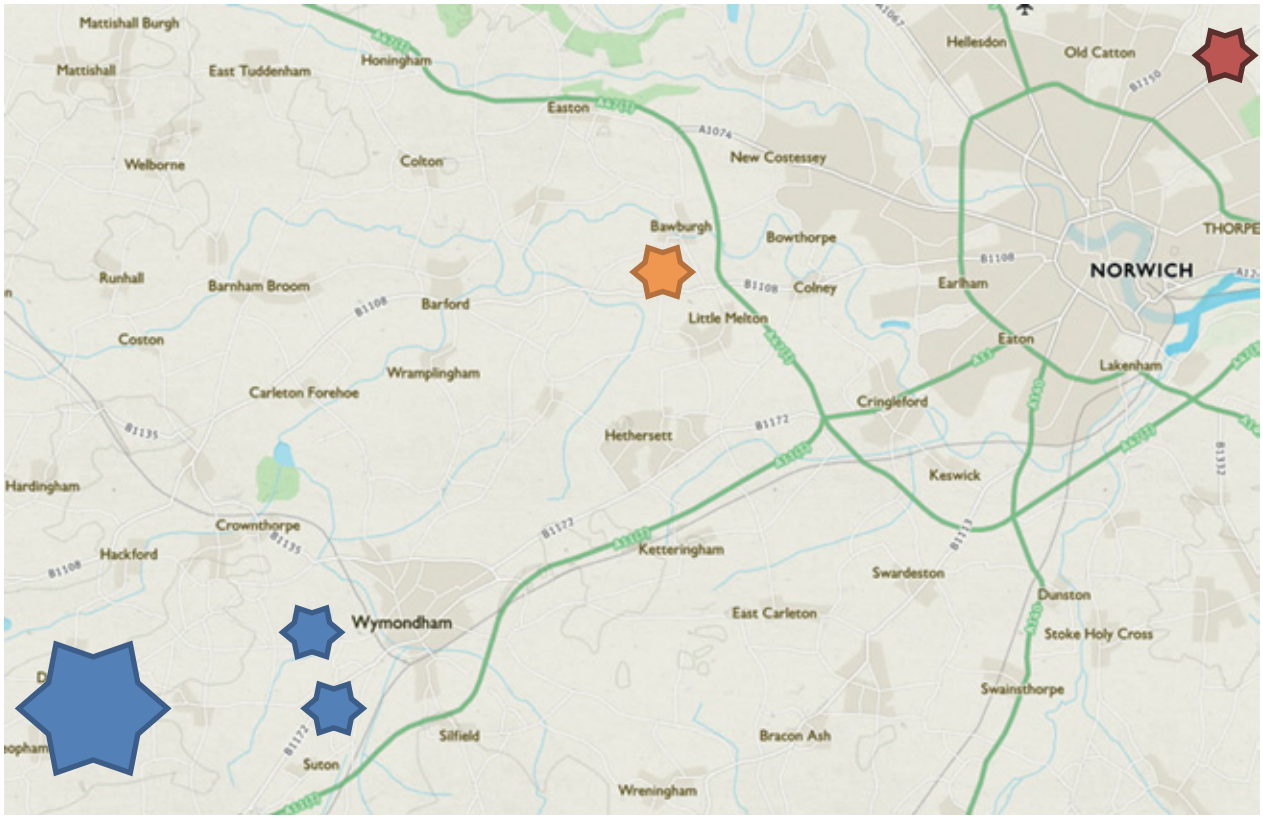
The Centre for Ecology & Hydrology is establishing a long-term network of soil moisture monitoring stations for the United Kingdom. Morley Farms has been chosen as one of the sites in East Anglia. The network will provide near-real time soil moisture data for use in a variety of applications including farming, water resources, flood forecasting and land-surface modelling.
The station is equipped with an instrument that uses cosmic-rays to sense soil moisture over an area of almost 40 hectares (about 100 acres). Data from the network have the potential to transform the way that we understand and model the natural environment.
The weather data is available on the TMAF website as a monthly summary.

The Morley Cosmic-ray Weather Station

More information available www.cosmos.ceh.ac.uk and is part funded by Natural Environment Research Council (NERC).



The Morley Agricultural Foundation Land Holdings

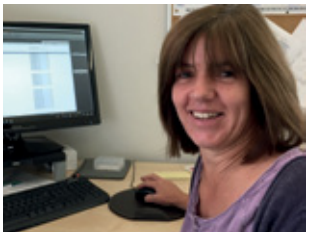


Land owned by TMAF rented to Morley Farms Ltd.

Land owned by John Innes Centre rented to Morley Farms Ltd.

Land owned by TMAF rented to Wroxham Home Farms.

Contact The Morley Agricultural Foundation



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Every effort has been made to make this document accurate as of January 2019

THE MORLEY AGRICULTURAL FOUNDATION

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