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Research Projects in Progress

Rothamsted Research

Rothamsted Research (1998) *Research Projects in Progress* ; Iacr Report For 1998, pp 48 - 58

Research Projects in Progress

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Adapting new crops for the UK climate: genotype and environment interactions on development, structure and yield of lupins
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Reed Canary Grass (*Phalaris arundinacea*): development of a new crop for the production of chemical pulp and biofuel
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Application of gene technology and chromosome visualisation for improved UK adaptability of white lupins
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Monitoring growth and yield of crops grown as biofuels and measuring nutrient content of various components of the aerial biomass
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Creation of varieties and technologies for increasing production and utilisation of high quality protein from the white lupin in Europe
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European *Miscanthus* improvement: breeding and selection of new genotypes of *Miscanthus* to improve yield and product quality
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Diagnosing crop N status with a chlorophyll meter
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Plant and soil testing to assess the adequacy of P supply to oilseed rape crops
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Switchgrass (*Panicum virgatum*) as an alternative energy crop in Europe
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The physiology of late season and post-harvest changes in the quality of sugar beet storage roots
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Biology, ecology, genetics and control of weeds in arable agriculture, including herbicide-resistant biotypes **Lutman P.J.W.**

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Developing strategies for reducing the risk from herbicide-resistant wild-oats
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Herbicide resistance in black-grass and wild-oats
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Molecular genetics of herbicide resistance
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Miller A.C.E.

The vulnerability of new xenobiotics to the evolution of resistance
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Weed competition and crop canopy manipulation in winter wheat
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Botanical and rotational implications of genetically modified herbicide tolerance - baseline monitoring
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Exploiting weed patch dynamics - development of spatially selective weed control techniques
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Characterisation and diagnosis of viruses affecting tropical crops
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Assessment of genome variation amongst bymovirus isolates from China and Europe and the design of transgenic resistance strategies
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Response of winter barley cultivars to barley mild mosaic and barley yellow mosaic virus
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Indo - UK collaboration on oilseed crops (visiting scientists)
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Impact of transgenic potatoes expressing lectins against aphids and their parasitoids
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Foraging strategies of generalist and specialist aphid parasitoids: a comparative approach
Poppy G.M.

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Elucidating the changes in plant chemistry induced by aphid feeding and which are involved in plant signalling and attraction of parasitoids
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Quantification of the effects of pesticides on the population dynamics of beneficial arthropods
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Potential of plant defence mechanisms and disrupting nematode behaviour for nematode control
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Basis and development of molecular approaches to nematode resistance
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Cyst and root-knot nematodes in potato land
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Microbial pathogens in the management of invertebrates
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The development of improved control strategies for *Varroa jacobsoni* by integrating research on mite populations and virus epidemiology
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Immunodiagnosics for monitoring the release of *Phasmarhabditis hermaphrodita*, the slug biological control agent, in the environment
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Measurement and simulation of spatio-temporal dynamics in cereal aphids to reduce pesticide inputs
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Genetic manipulation of nitrogen-use efficiency in wheat
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Cellular ion homeostasis in plants subjected to salinity stress
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Crops self reporting for their nutrient status: a feasibility study
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Molecular characterisation of genes and proteins involved in sulphate uptake and translocation
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Improving wheat model accuracy and suitability for regional impact assessment (IMPETUS)
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Evaluating sugar-beet resistance to yellowing viruses
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Brimstone phase IV: reducing phosphorus losses from arable soils
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A fundamental study of the cycling of sulphur in soil-crop systems
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Soil fertility management for sustainable hillside farming systems in Nepal
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Comparison of microbial gene presence and activity in soil: developing methods to study gene expression using RNA extracted directly from soil
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Novel DNA diagnostic technology in plant disease control
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Fungicide resistance in cereal pathogen populations
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Biology and control of tropical weeds Terry P.J.

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Management of *Cyperus* in smallholder farming systems on vertisols and vertic clay soils

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Terry P.J.

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Evaluation of combined food and energy systems for more efficient land use and environmentally benign sustainable production

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Processes and interactions underlying crop, weed and disease management in less intensive integrated production systems

Jordan V.W.L.

Agronomy and environmental implications of cultivation systems: effects on soil substrate, agrochemical and nutrient emissions and crop protection requirements

Jordan V.W.L.

Integrated and lower input crop management

Jordan V.W.L.

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Greaves M.P.

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Using population genetics to determine species dispersal for managing diversity in fragmented agricultural habitats

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Methods to diversify field margin plant communities

Marshall E.J.P.

Environmental behaviour and efficacy of crop protection compounds Bromilow R.H.

Brimstone farm project on the leaching of pesticides to drainage water from a structured clay soil

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Measurement of physicochemical properties of organic compounds that influence their environmental behaviour

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Principles underlying pesticide persistence and leaching in soils, and their use in expert systems and simulation models

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Chemistry of novel and established pesticides Khambay B.P.S.

To examine structure-activity relationships within plant derived pesticides with the aim of developing novel resistance defeating pesticides

Khambay B.P.S.

To assess pesticidal activity of extracts of natural flora and fauna and of synthetic analogues

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To explore the potential of peptidic natural products, and their synthetic analogues, for pest control

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To identify antipest agents for the development of pest control especially against resistant organisms

Khambay B.P.S.

Analysis of bioactive plant extracts

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Help overcome or avoid resistance by understanding its biochemistry and molecular genetics

Devonshire A.L.

Multidisciplinary study of acetylcholinesterase structure and function

Devonshire A.L.

Implications of pesticide resistance for pest management in horticultural crops

Denholm A.I.

Monitoring and management of insecticide resistance in *Myzus persicae*

Denholm A.I.

A systems approach to sustainable insect pest management in irrigated cotton in India

Denholm A.I.

Management of insect pests and viruses of tobacco using ecologically compatible technologies

Devonshire A.L.

Combating insecticide resistance in peach potato aphids in the UK

Foster S. P.

The chemical ecology of pests and beneficial species

Pickett J.A.

Insect behaviour control using semiochemicals

Pickett J.A.

Semiochemical-based control of pests and diseases of oilseed rape

Pickett J.A.

Identification, biosynthesis and associated molecular genetics of semiochemicals for a new basis of pest and disease regulation

Pickett J.A.

Understanding the chemical ecology of pests and beneficial organisms

Wadhams L.J.

Role of wild habitat in the invasion of cereal crops by stem-borers, *Chilo partellus*, *Busseola fusca*, in Africa

Wadhams L.J.

Improving biological control of thrips and aphids on protected ornamentals

Wadhams L.J.

The chemical ecology of pests and beneficial organisms in agricultural and semi-natural ecosystems

Pye B.J.

Integrated pest management of aphids on outdoor lettuce crops

Wadhams L.J.

Environmental impact of transgenic plants on beneficial insects

Wadhams L.J.

Outdoor lettuce: methodologies to develop plant volatiles to manipulate aphid numbers in the field

Wadhams L.J.

Nepeta species as a non-food, crop-derived feedstock for the production of semiochemicals for aphid control

Wadhams L. J.

Production of mosquito oviposition attractant pheromones from the plant *Kochia scoparia*

Pickett J.A.

The molecular basis of interactions between plant pathogens and their hosts

Lucas J.A.

Isolation and characterisation of pathogenicity genes from the downy mildew *Peronospora parasitica* using phage display and phage antibody approaches

Bowyer P.

Isolation and characterisation of pathogenicity genes from the wheat pathogen *Pseudocercospora herpotrichoides* using signature and tagged insertional mutagenesis

Bowyer P.

Molecular genetic tools for manipulating pathogenicity/avirulence genes in the cereal fungal pathogens, *Stagonospora nodorum* and *Mycosphaerella graminicola*

Hargreaves J.A.

To characterise the molecular nature of adhesion and differentiation of infection structures of fungal pathogens

O'Connell R.J.

Rational design of novel fungicides effective against plant pathogens

Bowyer P.

Molecular characterisation of appressorium morphogenesis on *Peronospora parasitica* using display antibodies

Bowyer P.

Antisense RNA technology for validating fungicide targets in plant pathogenic fungi

Lucas J.A.

Isolation and characterisation of fungal genes involved in biotrophy and plant-fungal recognition in the *Colletotrichum lindemuthianum*-bean interaction

O'Connell R.J.

Genetic variation in foliar and stem base cereal pathogens

Lucas J.A.

Determinants of pathogenicity and host range in plant pathogenic fungi

Lucas J.A.

Proteins and enzymes implicated in fungal pathogenicity to plants

Lucas J.A.

Genome diversity

Karp A.

Investigation of the molecular basis of somaclonal variation in oil palm tissue cultures and regenerants with a view to identifying markers for specific phenotypic abnormalities

Karp A.

Development, optimisation and validation of molecular techniques for the measurement, characterisation, evaluation and accessing of biodiversity

Karp A.

Molecular markers for genebanks: application of marker technology for the improvement of *ex situ* germplasm conservation methodology

Karp A.

Use of molecular genetics in understanding the population biology of key species in arable systems

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Decision systems technologies and development

Verrier P.J.

Design and develop a software framework suitable for the construction of arable crop decision support systems

Verrier P.J.

Enabling technologies for decision support systems
Verrier P.J.

Decision support systems shell with specific DSS for fungicide application to winter wheat
Verrier P.J.

Animated simulation of wheat growth
Verrier P.J.

ERA database of cereal pathology data
Verrier P.J.

The development, structure and composition of seeds and other plant storage organs in relation to end use quality *Shewry P.R.*

Wheat gluten proteins: their characterisation and role in determining the functional properties and end use quality of wheat
Tatham A.S.

Mechanisms of protein synthesis, processing, targeting and deposition in plant cells
Napier J.A.

Analysis and manipulation of the protein and oil compositions of oilseeds
Shewry P.R.

Exploring and improving the functional properties of wheat gluten using protein engineering and transgenic wheat plants
Shewry P.R.

The structure, targeting and molecular interactions of sunflower oleosins in relation to oil body structure and biogenesis
Shewry P.R.

Structural and biochemical components of barley endosperm which influence malting quality
Shewry P.R.

The rheology and structure of wheat gluten protein
Tatham A.S.

Monoclonal antibody tests for wheat quality
Tatham A.S.

Improving the quality of EU wheats for use in the food industry
Shewry P.R.

Improving the functional properties of durum wheat by transformation
Shewry P.R.

Structural and rheological determinants of gas cell expansion in baked product doughs
Tatham A.S.

Isolation of DNAs for novel fatty acid desaturase enzymes and their use to manipulate fatty acid and triglycerol composition in transgenic plants
Napier J.A.

Structural and biochemical components of barley endosperm which influence its raw quality for malting
Shewry P.R.

Crop Genetics *Edwards K.J.*

A generalised system for the rapid and inexpensive determination of the genetic function of ESTs: use in the analysis of maize embryogenesis
Edwards K.J.

Development of brassica microsatellite markers for use in fingerprinting and mapping
Edwards K.J.

Map based cloning of agronomically important genes directly from *Zea mays*
Edwards K.J.

Analysing the function of existing and novel genetic promoters for tissue specific expression of transgenes in *Zea mays* (ZEROPA)
Edwards K.J.

Development of the tools required to dissect large plant genomes and their application to a complex region of the maize genome linked to a disease resistant super locus
Edwards K.B.

Determining the genetic function of conserved plant expressed sequence tags using a maize mutator grid
Holdsworth M.J.

Development of a non-gel-based high throughput genotyping assay using previously characterised single locus microsatellite markers
Edwards K.J.

Random sequencing of mutator tagged fragments
Edwards K.J.

Enabling technologies for physical and functional genomics in crops of agricultural importance
Edwards K.J.

Root development and responses to environmental stress *Barlow P.W.*

Molecular analysis of *COW1*, a regulator of cell shape in plants and genetic analysis of root hair development in *Arabidopsis thaliana*
Grierson C.S.

Experimental investigations into the controls of growth, development and morphogenesis of primary and secondary plant tissues, particularly as affected by the cytoskeleton
Barlow P.W.

Molecular analysis of *TIP2*: a gene that controls cell shape in root hairs and pollen tubes of *Arabidopsis*
Grierson C.S.

Rice for life: seeking a physiological and molecular basis for improving submergence in rainfed lowland rice
Jackson M.B.

A study of anti-transpirant activity in xylem sap of flooded plants
Jackson M.B.

Adaptive responses of plant root and shoot systems to environmental stress
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Wood formation processes: the key to improvement of the raw material
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Integration of cellular responses *Hooley R.*

Biomolecular design and perception of plant signalling compounds
Hooley R.

Dissection and manipulation of signal transduction pathways mediating metabolic regulation of gene expression in plant storage organs
Halford N.G.



DNA-protein interactions in an alpha-amylase gene transcription complex
Huttly A.K.

Intracellular signalling in aleurone cells
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Regulation of plant development through gibberellin signal transduction
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Functional analysis of a higher plant G protein-coupled receptor
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Genetic regulation of sink strength in wheat and potato - GRiSSt
Halford N.G.

Developmental events during seed maturation *Lenton J.R.*

How does ABI3 regulate the transition to embryo dormancy in *Arabidopsis thaliana*?
Holdsworth M.J.

Molecular mechanisms regulating seed dormancy and embryogenesis
Holdsworth M.J.

Fracture of oilseed rape pods
Child R.D.

Characterisation of genes controlling pre-harvest sprouting in wheat and their manipulation in transgenic plants
Holdsworth M.J.

Engineering shatter resistance into oilseed rape
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Malting quality of barley
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Genetic improvement of oilseed rape for increased resistance to pod shatter
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Genetic improvement of oilseed rape pods to reduce susceptibility to shatter
Child R.D.

Regulation and genetic manipulation of pre- and post-harvest sprouting in cereals
Lenton J.R.

Regulation of plant development through gibberellin biosynthesis *Hedden P.*

Structure and function of gibberellin-biosynthetic enzymes
Hedden P.

Cloning and expression of genes involved in gibberellin biosynthesis
Phillips A.L.

Regulation and genetic manipulation of gibberellin biosynthesis
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Molecular dissection of the feedback mechanism in gibberellin biosynthesis
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Elucidating and manipulating bolting and flowering mechanisms in sugar beet
Van Roggen P.M.

Chemical, biological and technological approaches to optimising agrochemical performance and weed control *Holloway P.J.*

Predicting the potential of adjuvants to affect pesticide residue levels in crops
Holloway P.J.

Bioherbicides: strategies for their development and use
Greaves M.P.

Rational usage of adjuvants for improving the safety and efficiency of pesticide spray delivery
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Spraying characteristics for more efficient agrochemical performance
Holloway P.J.

New applications for polymers in optimising the performance of foliage-applied formulations of agrochemicals
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Herbicide studies
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Optimising biological control of a dominant weed in major crops
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