IRELAND

National Progress Report on Agricultural Meteorology

1987—1990

to
Commission for Agricultural Meteorology (CAgM)
of the
World Meteorological Organization (WMO)

Compiled by the
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IRELAND

Irish National Progress Report, 1987—1990

1. Changes in Organization

1.1 The Agrometeorological Unit has been incorporated into a reorganized Climatological and Applications Division. A new emphasis is placed on the the development of appropriate data bases which facilitate a quick and focussed response to requests and which enable the production of a comprehensive range of services of a high technical quality.

1.1.1. The AGMET Group, an interdisciplinary group formed in 1984, has continued to provide a forum for cooperation and fostered the development of agrometeorology for the agricultural community. It has taken an active role in the introduction of a number of new agrometeorological services (see 4.4). While the Group is an informal one, it has the formal approval of the parent organizations.

1.2 The separate agricultural research and advisory services were brought together into a single organization with numbers reduced by almost 40 per cent. While concerned with traditional production farming, the new Agricultural and Food Development Authority (Teagasc) places increased emphasis on food processing, the environment, alternative enterprises, farmer education and integrated rural development. A positive effect has been a move towards increased reliance on agrometeorological type support services, e.g. use of weather forecasts and model outputs. The changes have also made it difficult to maintain the existing level of agroclimatological stations run by the Research Centres (see 2.1).

1.3 New entrants to farming are required to undergo a formal education course in farming entitled Certificate in Farming. Through the activities of the AGMET Group, plans for the introduction into this course of a module on weather and climate are well advanced. An appropriate curriculum (core material and its application) has been set out, a handbook (to be entitled Weather, Agriculture and the Environment) is well underway, and a series of seminars are to be given to the Course Education Officers.

2. Agrometeorological Observations

2.1 With reduced budgets it is increasingly difficult to maintain the same quality and level of daily weather/climat observations from manual (agro)meteorological stations. One station (Galway) of the synoptic network was closed in 1989 and another (Roche's Point) is about to be closed. Because of the closure of a number of Agricultural Research Centres, two agrometeorological stations have also been closed down.

2.2 An AGMET working subgroup, which studied the role of automatic recording for agroclimat stations, published recommendations for those intending to introduce automatic weather recording, setting out standards for sensors and equipment, procedures for the compatibility of recording and the storage and transmission of meteorological data. A national network was envisaged whereby the recorded data are transmitted once daily to a central data bank in the Meteorological Service. Preparations for the system are well advanced and a number of the installations are already in place (Burke, 1987).

3. New Agrometeorological/climatological Research

3.1 Influence of Meteorological Factors

3.1.1 A joint study by the Grange and Moorepark Research Centres of the National Agricultural Authority, Teagasc, to analyse the effects of weather on growth, yield and quality of silage has been undertaken. This study uses existing data sets accumulated over several years at Grange. Recorded met data and weekly grass yield and composition, and the interaction with the frequency of cutting for each of three grass types, are being analysed. Dry, cold, sunny weather increases sugar levels and dry matter, which make the grass easier to preserve by ensilage. A model is being produced.

Teagasc, Moorepark and Grange Research Centres (P O'Kiely, A.J. Brereton)

3.1.2 Relationship of met data and the extent of wilting of grass (wilted grass produces less effluent) with different tedding/conditioning treatments is under study. Wilting rate is increased by more frequent treatments and that is particularly so in dry, sunny weather, thereby reducing silage effluent production and making the grass easier to preserve. The effect can be negative during wet weather. A model is being produced.

Teagasc Grange Research Centre (P O'Kiely)

3.1.3 Meteorological conditions on factors affecting the availability of lactic acid bacteria numbers on grass, water soluble carbohydrates levels and buffering capacity is being studied at Grange Research Centre. Grass-lactic acid bacteria levels are lower during periods of intense sunlight. Teagasc, Grange Research Centre (P O'Kiely)

3.1.4 Benefits of fungicide treatment of grass on yield and quality under a range of meteorological conditions—a study is in progress. Certain categories of disease are favoured which vary with the weather conditions . Teagasc, Grange Research Centre (P O'Kiely)

3.1.5 Effect of grass growth in winter/early spring on first cut silage quality is under study at Grange. The importance of bare sward on first cut silage quality depends on preceding winter temperature—mild winters are detrimental to silage quality.

Teagasc, Grange Research Centre (P O'Kiely)

3.1.6 There is a significant reduction in total and leaf DM yields of grass in early spring for each one month delay in closing date in autumn. For accurate prediction of spring DM, information about the differing amounts of dry matter accumulated after the last autumn grazing, as well as accumulated temperature must be taken into account.

Teagasc, Johnstown Castle Research Centre (O.T. Carton/W.F. O'Keeffe)

3.1.7 The ideal date of autumn closure is not a simple decision and the optimum date varies from year to year depending on temperature. Despite conventional wisdom to close in late October, trials show that a light grazing in November, if the month is mild and there is no threat to poaching, to remove excess leaves and so allow tillering to continue, may be beneficial to early grass. Teagasc, Johnstown Castle Research Centre (N. Culleton)

3.1.8 A study is made of the effects of rainfall and evaporation on water-table depth and trafficability on wet soils of the west of Ireland. This study extends earlier work (Brereton and Hope Cawdery, 1988; Brereton, 1989). The work also examines the effects on herbage

production. Teagasc, Moorepark (A J Brereton)

3.1.9 An analysis of the growth and yield of Jerusalem artichoke in Ireland; comparisons are made with the performance of the crop in continental Europe, particularly with respect to differences in meso - and macrometeorology.
University College, Cork, Plant Biotechnology (M.L. Deadman)

3.2 Methods of Agrometeorological Forecasting

3.2.1 A study was undertaken at UCG using the Bouchet/Morton method of deriving evapotranspiration for large areas. The CRAE (Complementary Relation Areal Evaotranspiration) model was tested in four catchment areas. Modified Penman estimates of evapotranspiration were always less than CRAE ranging from 76% to 88% of CRAE over four catchments; net radiation estimated using CRAE method averaged about 77% of the measured values at Kilkenny (Zhang Yi, 1990).
UCG Dept of Engineering Hydrology. (Zhang Yi and S.Regan)

3.2.2 A computer based model to simulate the growth and development of sugar beet has been developed. Daily updates of crop state using various environmental and meteorological factors are made. Outputs of current dry matter in the various plant parts as well as potential yield are produced at user specified intervals and respiration rates (model for inclusion in CARS-Food). Teagassc, Oak Park Research Centre (J. Burke)

3.2.3 Studies of crop growth and development for winter wheat aimed at improving farm level efficiency have been incorporated into a computer model. The overall objective is to determine exactly the phenological development rate so as to improve accuracy in estimation of correct timing of nitrogen, herbicides and growth regulators. Simulations of potential yield were also carried out based on climatic conditions at Oak Park (CARS-Food).
Teagasc, Oak Park Research Centre (J Burke)

3.2.4 The use of remote sensing to estimate leaf growth in conjunction with modelling is undertaken at Oak Park. Field measurements of spectral reflectance over beet crops at various stages of development are obtained at approximately 10 nm resolution over the spectral range 450-950 nm. These are complemented by more frequent filter radiometer measurements taken during the growing season, together with crop parameters and photosynthetically active radiation (PAR). Teagasc, Oak Park Research Centre (J Burke)

3.2.5 A new study to develop a similation model of a grassland farm has been undertaken. The model uses the PC version of the CSMP (Continuous Simulation Modeling Program (CAgM Report No 33B)). The primary driver is weather related. A subsidiary component will incorporate the special features of wet land farming, i.e. trafficability. The simulation will be used to develop a feed forecasting/budgeting capacity.

The dynamic simulation using CSMP will replace the existing simple grass growth model (Brereton and Hope Cawdery, 1988) (CARS-Food). The application of the simple model is limited to a narrow range of management scenarios and this has given voice to "negative consumer reaction". Teagasc, Moorepark Research Centre (A.J. Brereton)

3.2.6 A (PC) computer based model was developed to simulate the drying of a column of peat consisting of an undisturbed layer at the lower end and a layer of milled peat at the top. The effects of different milling depths, water-table levels, etc. can be evaluated. In addition a 4-day predictive model of evaporation using wind speed, dry-bulb and dew-point temperature, solar radiation and geographic location is used to drive the model and enables milling depth to be varied in response to the evaporative and rainfall descriptions (Ward *et al*, 1988). University College, Dublin, Agricultural Engineering (S. M. Ward)

3.2.7 Use has been made of synoptic meteorological station data for the validation, in Ireland, of SUCROS 87, a Dutch crop growth model, as applied to the growth of Jerusalem artichoke. A comparison of model predictions for growth in Ireland and continental Europe was made. Limited extension of SUCROS 87 was made to encompass variations in planting date, and the effect of planting date and soil climate on time taken from planting to emergence from the soil. University College, Cork, Plant Biotechnology UCC Ltd (M.L. Deadman)

3.2.8 Fluctuations in the abundance of migratory trout are regulated by climatic influences. Arising from research in Waterville, Co Kerry, on sea trout (*Salmo trutti*), 71% of two year old smolts are shown to make an average of 3.6 cm growth in length in the spring of their first migration to sea (in addition of 19% on length at the end of the last premigration winter). These type "B" increments are crucial to bringing the fish to threshold size for migration. Both incidence and amount of B growth are shown to be regulated by growing conditions (threshold temperature 5.6°C) in spring. Fisheries Research Laboratory (E Fahy)

3.3 Macro/Meso/Microclimatic Research

Nil reports available

3.4 Agrometeorological Methods for Agricultural Practices

3.4.1 Development of an operational PC based integrated geographic Information System (IGIS) for forestry and agriculture modelling within the less favoured areas in Ireland was made. Input data include TM and SPOT remote sensing (satellite) imagery. Techniques provide a basis for modelling and detecting changes in agricultural land use—useful in forest inventory and agriculture (CARS-Food).

University College, Dublin, Department of Forestry (M Mac Siurtain)

3.4.2 The frequency of occurrence of 2 and 4 dry-day periods are linked with silage making and peat extraction operations respectively. Probability levels for the occurrence of these dry spells are given and the required mechanization system power rating for wilted silage is calculated (Ward, 1989).

University College, Dublin, Agricultural and Food Engineering, (S.M. Ward)

3.4.3 The length of the grazing season is controlled by ground conditions on wet lands (with low infiltration) than by the seasonal grass growth curve. Climatic records at Kilmaley, Co Clare, show that, except for short periods in mid-summer, rainfall exceeds evapotranspiration for most of the grazing season. Research shows that the length of the grazing season is governed by the rainfall intensity and the degree of drainage provided (Kiely and Galvin, 1988) Teagasc, Moorepark Research Centre (J. Kiely)

3.4.4 An objective method of drawing climatological maps of sunshine, rainfall percentage and rainfall amount, which is used operationally at the Irish Meteorological Service, can easily be adapted to mapping yield model outputs. The interpolation is based on McLeins method of distance weighted least square quadratic approximations. Problems with data near coasts and in data void areas were overcome by the introduction of dummy values (based on nearby observations and climatological normals) (Hamilton *et al*, 1988).

Meteorological Service (J Hamilton)

3.5 Influence of Meteorological factors on Livestock

Nil reports available

3.6 Protection of Plants/Livestock

3.6.1 A project for the study of the relationship of meteorological conditions and the environment in animal housing is currently being undertaken.

Teagasc, Grange Research Centre (R Fallon/P O'Kiely)

3.7 Crop and Livestock Pests and Diseases

3.7.1 A study of the dispersal of *dictyocaulus viviparus* larvae from bovine faeces in Ireland suggest a possible method of forecasting infection of calves. Meteorological conditions suitable for the growth of Pibobolus species are wet, cool and cloudy spells. The presence of Pibobolus sp on dung pats were significantly correlated with hours of bright sunshine (negative corr.), total rainfall as well as height of surrounding herbage. It was also indicated that under dry meteorological conditions birds could play a major role in the dispersal of *D. viviparus* larvae. (Somers *et al*, 1985). Teagasc, Grange Research Centre (S.Somers)

3.7.2 Relationship of meteorological conditions and animal parasite problems has been studied over a number of years. Teagasc, Grange Research Centre (N Downey/P O'Kiely)

3.7.3 Sheep scab mite viability and reinfectivity off the host - a Ph.D study in progress. Environmental and clinical observations recorded over a period of four months.

Veterinary Laboratory, Castleknock, Dublin 15 (D O'Brien)

3.7.4 Investigations to determine climatic factors affecting air and splash transport of *Drechslera teres* conidia were made. Multiple regression analysis suggests that windspeed, air temperature, and temperature as it affects spore production, could be used to predict the air borne conidial concentration. University College, Dublin, Dept of Environmental Resource Management, Faculty of Agriculture (BM Cooke)

3.7.5 Rain-mediated dispersal of *Dreshslera teres* conidia was studied in field plots of spring barley. The number of spores sampled appeared closely related to rainfall intensity (Deadman and Cooke, 1989).

University College. Dublin, Dept of Plant Pathology (ML Deadman/BM Cooke)

3.7.6 The effect of mist particles on the dispersal of *Drechslera teres* conidia—a wind tunnal experiment. Mist particles, driven by a wind velocity of 2.78m s^{-1} resulted in surface run-off of leaf water containing conidia. It appears that the direct effect of mist particles on the dispersal of *D. teres* conidia is limited to short-distance downward dispersal in surface run-off

of leaf water within the crop (Deadman and Cooke, 1990). (ML Deadman, Plant Biotechnology, UCC, and BM Cooke, Dept of Environmental Resouce Management, UCD)

3.7.7 An assessment was made of meteorological factors influencing disease development in field crops in Ireland, in particular potato late blight and field diseases of Jerusalem artichoke.
University College, Cork, Plant Bistechnology (ML Deadman)

3.8 Pollution of the Biosphere

3.8.1 Pollution-free disposal of slurry depends on soil, site and climate. Soil and climatic data are studied to estimate both absolute and temporal, individual, soil-hydraulic-loading limits under Irish conditions. The duration of soil moisture deficits (SMD) indicate that slurry can be spread over significantly larger periods in some regions than in others. The concept of winter rain acceptance potential (WRAP) was used to assess the posibilities for slurry spreading outside of SMD period (Gardiner, 1986).
Teagasc, Kinsealy Res. Centre (MJ Gardiner(deceased))

3.8.2 As part of international studies of biogeochemical cycles in the North Atlantic, major ions (O , CFCs, N_2O, CH_4, CO) in precipitation and aerosols in Atlantic air are measured at Mace Head Atmospheric Research Stations in Galway—ozone levels affect plants. Interest is on air-borne plant nutrients for forestry in the west of Ireland.
University College, Galway, Physics Dept (T C O'Connor)

The effects of agriculture on water quality and the waste management research programme at Johnstown Castle have a number of components related to weather. A number of studies are in progress to determine the effects of land use and different agricultural management practices on the leaching and runoff of nutrients to groundwater and surface waters respectively. The programme objective is to provide management strategies/techniques for the farmer which will facilitate the efficient recycling of slurry nutrients, particularly nitrogen, on the farm while reducing pollution and disease dispersal risks.

3.8.3 In a lysimeter unit, nitrate leaching in drainage water from barley and fallow land are determined both with and without nitrogen fertilizer. The amounts of nirate leached throughout autumn/winter each year are related to the weather conditions during the previous growing season, the date of emergence of the nitrate peak is dependent on rainfall and the total annual volume of drainage water affects mean nitrate concentration.
Teagasc, Johnstown Castle Research Centre (Marie Sherwood)

3.8.4 In field experiments losses of nitrate from grazed grassland are also studied and correlated with various soil and weather parameters. In a small catchment study at Johnstown Castle, weather data are used extensively in interpreting the results of studies of loss of nutrients in surface runoff water and in field drainage water, following landspreading of animal manures and fertilizer.
Teagasc, Johnstown Castle Research Centre (Marie Sherwood)

3.8.5 Disease dispersal following land application of animal wastes—animal slurries may contain disease organism excreted by infected animals. Current, popular, landspreading techniques where the slurry is pumped against a plate (splashplate) creates an aerosol of slurry. This aerosol may contain disease causing organisms. With high wind speeds the disease can be dispersed over a wide area. The interactions between spreading method and

wind conditions on the dispersal of disease organisms is being studied.
Teagasc, Johnstown Castle (O. T. Carton)

3.8.6 Effect of slurry spreading method on the runoff of slurry nutrients—research at Johnstown Castle has shown that risk of nutrient runoff following landspreading is greatest if heavy rainfall occurs within 48 hours of spreading the slurry. This work was done using a splashplate tanker. The potential of the newer methods (bandspreading and shallow injection) to reduce the runoff risk is being evaluated.
Teagasc, Johnstown Castle Research Centre (O.T. Carton)

3.8.7 Effects of method and date of slurry application on the nutrient requirements and ensilability of the grass silage crop—animal wastes can provide nutrients for silage crop production. The phosphorus (P) and potassium (K) in slurry can be used by the plant as efficiently as fertilizer P and K. However, the slurry nitrogen is not as efficient as fertilizer nitrogen for grass production. This reduced efficiency is associated with the volatilization of the ammonium nitrogen from the slurry. Warm windy rather than cool wet conditions favour volatilization following land application of slurry. The interactions with weather are being studied. Teagasc, Johnstown Castle (O.T. Carton)

3.8.8 Interaction of slurry types, application rate, application method, fertilizer and weather on silage quality is investigated. The effects of rain and drought immediately after spreading are studied. Teagasc, Grange Research Centre (P O'Kiely)

3.8.9 The effects of soil temperature, soil moisture content and simulated rainfall on ammonia volatization from urea-treated pasture and tillage counterparts was investigated under controlled laboratory conditions. The results indicate that serious ammonia volatalization from fertilizer urea can occur not only under warm-dry conditions, but under cool wet conditions (McCarthy *et al*, 1987). University College, Dublin, Department of Agricultural Chemistry and Soil Science (S.J. McCarthy, P. O'Toole and M.A. Morgan)

3.8.10 Nutrient cycling in degenerate natural forests of Europe—natural forests are suffering declining productivity as a result of neglected management (particularly due to a lack of control of fire and grazing). Such exploitation could lead to critically low availability of nutrients especially in natural and semi-natural woodlands. Atmospheric pollutants in rainwater and mist and the effect on growth and the biogeochemical equilibrium are studied in this EC project. Coillte Teo (The Irish Forestry Board)(R. McCarthy)

4. Changes in Agrometeorological Services for Agriculture

4.1 Service Structure

4.1.1 Regional recorded weather forecasts (ATWS) which were formally made by the regional (aviation) forecast offices are now made from the Central Analysis and Forecast Office in Dublin. All regions are now covered on a 24-hour basis. Farmers are major users of the system. The number of calls to the regional ATWS (outside the Dublin city area) has increased by over 33% since 1986.

4.2 Types and forms of Service

4.2.1 The form and frequency of weather forecasts on national television was improved

greatly in 1988. Up to then one/two live forecasts per day using hand drawn graphics were televised. Since then a special weather office has been created at the national television studio (manned daily by one of a team of forecasters from the Central Forecast Office). Some six forecasts per day are now issued live on TV using up to date computer graphics facilities. With the improved professional presentation, a much more flexible service is provided for which there has been a strong positive audience reaction.

4.3 Service Methods

4.3.1 As part of the reorganized forecasts service on television a weekly forecast on Sundays was introduced with focus on farming (first proposed by the AGMET Group). The presentation includes information relevant to agricultural management such as soil temperature and moisture, grass/crop growth rates, and crop and animal diseases as they relate to the current and forecast weather. The agricultural information is assembled by the Agmet Unit from the various agricultural, veterinary, and media sources and filtered to the presenting forecaster. Model (simple) outputs are incorporated as routine guidance.

The results of a survey undertaken at an agricultural exhibition in 1990 showed that 48 per cent of farmers watched the weekly forecast regularly and a further 13% watched it on some occasions. The reasons given for failing to view the programme were unsuitable timing (Sunday 1400 hours) (44 per cent of the non regular viewers) or lack of awareness of the programme (33 per cent). A national promotion campaign was undertaken by the TV authorities subsequently and a new survey is to be undertaken shortly.

4.3.2 Due to a major overlap with the Monthly Weather Bulletin issued by the Climatological Services, the monthly Agrometeorological Bulletin (following 20 years publication and using provisional met. data) is to be incorporated into the former publication (with full quality control of the data) beginning January 1991 A separate but much reduced section in the newly and attractively designed Bulletin will be devoted to data of interest to agrometeorological users.

4.4 Collaboration with other institutions

4.4.1 The activities of the Agricultural Meteorology Unit are carried out in conjunction with the agricultural research and advisory services (Teagasc), the Department of Agriculture and Food, the veterinary authorities, university faculties of agriculture and national farming associations. Effective liaison is also maintained through regular meetings of the AGMET Group, members of which are drawn from these agricultural bodies and institutions as well as from the Meteorological Service. A Conference on Weather and Agriculture was held by the AGMET Group in 1988 (see Bibliography; also sections 1 and 2).

4.4.2 A sub-group (experts drawn from the agricultural advisory services , soils and environmental departments and from the Meteorological service) has been established by the AGMET Group to consider how best the Meteorological Service could alert farmers to minimize risks to the environment from agricultural activities based on the meteorological conditions. Runoff especially, and leaching to a limited extent, are of particular concern. It is planned that an alert service begin in 1991 on the possible risks to pollution through the medium of the weekly farming weather forecast. A report/booklet is also being compiled by the subgroup.

4.4.3 The Meteorological Service attends some of the premier national agricultural events each year. A large exhibition is mounted at the National Ploughing Championships including the use of on line computer/radar/satellite facilities. Sponsorship is usually obtained to defray expenses incurred. The attendance of a personality (forecaster) add to the attraction for the visitors. Farmer feedback is a major benefit from such participation.

4.4.4 The Meteorological Service cooperates with the Veterinary Authorities of the Dept of Agriculture and Food in the control of Foot and Mouth disease. The Dept purchased a dispersion model from Britian and the Meteorological Service has adapted it to be run on the Service's computer. As the virus plume is deflected by the terrain, a topography data bank of the country has also been acquired. A number of seminars for veterinary officers have been held by the Dept on a regional basis at which the Service, using on line links to the central computer, participates.

5. Economic benefits of weather forecasts

5.1 Specific example—Sugar Beet Harvesting

Beet harvesting was frequently interrupted during the month of October 1988 especially in the Mallow sugar beet factory area. Prolonged periods of rainfall occurred especially during the period October 21st to 26th, and no beet harvesting was possible especially in the south of the country. In consequence of this weather, beet reserves and supplies available to the factory at Mallow were not greater than 3 days supply on October 21st.

At this point a conscious decision was taken to reduce factory throughput in order to conserve available supplies. This decision was taken on foot of the 3-4 day weather forecast which on 21st October indicated at least a further four days with high risk of heavy rainfall.

On the 23rd October the weather forecast was indicating an improvement in weather from the 26th onwards and this confirmed a decision to reduce factory through-put in order to conserve available supplies to carry through until harvesting was possible again. In fact harvesting recommenced on a limited scale on the evening of 26th October and continued from there on.

The critical factor involved in such a situation for a sugar factory was the fact that if a close down occurred, it would cost at least £250,000 to recommence operations. In addition days lost could be critical because it extends processing at the back end in late December/early January when further losses can occur from frosted beet, etc. While reduced throughput did involve some cost it would not be more than £100,000 in the case of Mallow factory in the period referred to above. The fact of having a weather forecast available enabled the necessary decisions to be taken at least 24-36 hours earlier than otherwise would have been done, which in fact averted the temporary close of Mallow factory.

6. Names and Adresses of Institutions

Coillte Teo (The Irish Forestry Board), Sidmonton Place, Bray Co Wicklow.
Meteorological Service, Glasnevin Hill, Dublin 9.
Johnstown Castle Research Centre, Teagasc (Agriculture and Food Development Authority (AFDA)), Wexford.
Oakpark Research Centre, Teagasc (AFDA), Carlow
Plant Biotechnology UCC Ltd, University College, Cork.
Dept of Environmental Resource Management, Faculty of Agriculture, University College, Dublin.
Dept of Forestry, University College, Dublin.
Dept of Agricultural and Civil Engineering, Faculty of Agriculture, University College, Dublin.
Dept of Physics, University College, Galway.
Fisheries Research Laboratory, Abbotstown, Dublin 15

Grange Research Centre, Teagasc, Dunsanny, Co Meath.
Hydrology Engineering Dept, University College, Galway.

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M/AGPR, ANNEX II

CLIMAT APPLICATION REFERRAL SYSTEM (CARS)

CARS/Food INFORMATION ENTRY FORMAT

CARS entry No. Date of entry_____ Last updated_____
d m y d m y

1. OBJECT OF METHOD

1.1 Objective/title

A physiological growth model for sugar beet. "Siucra".

1.2 Key words Leaf area Biomass Root Growth

Photosynthesis Respiration

2. DESCRIPTION OF METHOD

2.1 Output (expected results and accuracy)

Daily/weekly values of photosynthesis (canopy)

Daily/weekly values of photosynthate partitioning

Daily/weekly values of crowned root yield

Final potential yield

2.2 Description

Siucra is a fortran based computer program which models sugar beet growth. While the model consists of a wide variety of functions and subroutines for performing such tasks as inputting meteorological data, crop data, partitioning dry matter to different plant parts, its central routine is that which describes the photosynthesis by the crop.

2.3 Input data

(1) An estimate of initial crop state (Dm/ha)

(2) DATE, dry bulb temp., wet bulb temp., max/min temp., rainfall, solar radiation/sunshine hours.

2.4 Operational requirements (including computer requirements)

PC (286 Microporcessor)

2.5 Validity, limits imposed by basic concept, constraints in application

The correlation co-efficients for potential yield and actual yield varied from 0.86 to 0.95 when used to predict final yield from July 3rd (0.86) to September 26th.

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3. VALIDATION/PROVEN USES

Has proven to be a useful technique in scheduling sugar beet harvesting in Ireland.

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4. REFERENCES

4.1 Author James I. Burke

4.2 Address Oak Park Research Centre, Carlow, Ireland

4.3 Reference source (in press)

Date July '90 Language Fortran Number of pages 45

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5. AVAILABILITY/SOURCES OF ASSISTANCE FOR FUTURE USERS

5.1 Contacts

James I. Burke
Oak Park Research Centre
Carlow

5.2 Nature of assistance available

Model available for sale to other parties.

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6. REMARKS

M/AGPR, ANNEX II

CLIMAT APPLICATION REFERRAL SYSTEM (CARS)

CARS/Food INFORMATION ENTRY FORMAT

CARS entry No. Date of entry ____ ____ ____ Last updated ____ ____ ____
d m y d m y

1. OBJECT OF METHOD

1.1 Objective/title

- Modelling grass growth (as a function of weather) to provide a means of evaluating the feed available in grassland farms.

1.2 Key words Grass Feed Animal Weather

Sun Rain Temperature

2. DESCRIPTION OF METHOD

2.1 Output (expected results and accuracy)

The model provides an estimate of the accumulation of herbage dry matter over 20-day periods (rotational grazing) which is within 15% of measured dry matter.

2.2 Description

Herbage growth is assumed proportional to radiation (calculated from sunhours). The slope of the relation between radiaiton and growth is determined by temperature (based on regression). Model output is adjusted in relation to soil water deficit.

2.3 Input data

Sunhours per day - average of 20-day period
Temperature - air temperature average of 20-day period
Rainfall - daily average of 20-day period.

2.4 Operational requirements (including computer requirements)

Programmed in several languages (GWBASIL and DBASE).
PC 640K with or without hand disk.

2.5 Validity, limits imposed by basic concept, constraints in application

Limited to situation (1) Where herbage is grazed at 20-day intervals. (2) Where grazing leaves a residual leaf area index of 1.0. (3) Where nitrogen use is moderate (250kg/ann) and (4) Where the pasture is composed of perennial rye grass.

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3. VALIDATION/PROVEN USES

1. Highly correlated with regional variations in total annual herbage yield accumulated (averages of several years). (1) Highly correlated with year-year variation annual total measured at one site. (2) Level of correlation decreases for comparisons between model and shorter-term growth (10-20 days). Has been used (1) to optimise feed utilisation in experimented grazing system. (2) to provide weekly bulletins to national media on grass feed availability.

4. REFERENCES

4.1 Author Brereton A.J.

4.2 Address Teagasc, Moorepark, Fermoy, Co Cork, Ireland

4.3 Reference source Irish J. Agric. Research 27)167-178) 1988

Date 1988 Language English Number of pages 11

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5. AVAILABILITY/SOURCES OF ASSISTANCE FOR FUTURE USERS

5.1 Contacts

A. J. Brereton
Teagasc, Moorepark
Fermoy, Co Cork
Ireland

or

W.E. Murphy
Teagasc, Johnstown Castle
Wexford
Ireland

5.2 Nature of assistance available

Brereton - basic concept
Murphy - operational use

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6. REMARKS

M/AGPR, ANNEX II

CLIMAT APPLICATION REFERRAL SYSTEM (CARS)

CARS/Food INFORMATION ENTRY FORMAT

CARS entry No. Date of entry _____ Last updated _____
d m y d m y

1. OBJECT OF METHOD

1.1 **Objective/title**

To predict phenological development and potential yield of winter wheat.

1.2 **Key words** phenology yield Development

2. DESCRIPTION OF METHOD

2.1 **Output (expected results and accuracy)**

Yield of winter wheat
Phenological Development
(Double ridge, Terminal Spikelet, etc.)

2.2 **Description**

Fortran Program

2.3 **Input data**

Sowing Date
Variety
Location
Wet/dry bulb temp
Max/Min temp
Relative Humidity
Rainfall
Solar Radiation/Sunshine hours

2.4 Operational requirements (including computer requirements)

Micro Vax or equivalent

2.5 Validity, limits imposed by basic concept, constraints in application

See 3.

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3. VALIDATION/PROVEN USES

Tested in Ireland over 3 years and proved to be reliable.

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4. REFERENCES

4.1 Author James I. Burke

4.2 Address Oak Park Research Centre, Carlow

4.3 Reference source Personal communication

Date Language Fortran Number of pages --

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5. AVAILABILITY/SOURCES OF ASSISTANCE FOR FUTURE USERS

5.1 Contacts James I Burke
Oak Park Research Centre
Carlow

5.2 Nature of assistance available

Advisory & exchange of ideas

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6. REMARKS

CLIMAT APPLICATION REFERRAL SYSTEM (CARS)

CARS/Food INFORMATION ENTRY FORMAT

CARS entry No. Date of entry d m y Last updated d m y

1. OBJECT OF METHOD

1.1 **Objective/title**

Development of an operational PC-based Integrated Geographic Information System (IGIS) for forestry and agriculture; modelling within the less favoured areas in Ireland.

1.2 **Key words** Remote Sensing, Integrated Geographic Information Systems, Databases, Modelling, Forestry Agriculture, PC's, Modem Communication

2. DESCRIPTION OF METHOD

2.1 **Output (expected results and accuracy)**

Software available to end users via the telecommunications network which will provide online access to satellite image products from an integrated G.I.S.

2.2 **Description**

Software developed in Fortran and C. Thematic mapper and SPOT XS-P imagery. Vector data from Digitization or raster scanning and frame graphing.

2.3 **Input data**

TM & SPOT satellite imagery. Vector data from digitization, raster scanning. Attribute data.

2.4 **Operational requirements (including computer requirements)**

PC with VGA graphics, min 40 MB HD, 2.0MB RAM. 1.44 MB disk drive. MODEM, Kermit or FTP, copy of software.

2.5 **Validity, limits imposed by basic concept, constraints in application**

Methodology has been validated and proven effectively. Techniques will provide basis for modelling and detecting changes in agricultural land use.

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3. VALIDATION/PROVEN USES

Mapping of resources (1:50,000; 1:25,000 scales). Multitemporal analysis, change detection. Useful in forest inventory and agriculture.

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4. REFERENCES

4.1 **Author** Mac Siurtáin et. al. 1990.

4.2 **Address** Remote Sensing Laboratory, Forestry, UCD, Dublin 4.

4.3 **Reference source** National Survey of Private Woodlands Remote Sensing Feasability Study.
Date 1990 **Language** English **Number of pages** 32

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5. AVAILABILITY/SOURCES OF ASSISTANCE FOR FUTURE USERS

5.1 **Contacts**

Mairtin Mac Siurtáin
Remote Sensing Laboratory, Forestry,
University College Dublin, Belfield,
Dublin 4

5.2 **Nature of assistance available**

Expertise in RS-IGIS

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6. REMARKS

Our expertise relates primarily to Forestry and Agriculture Integrated Geographic Information Systems.