THE BELGIAN CROP GROWTH MODELLING SYSTEM (B-CGMS)
CONTRIBUTION OF REMOTE SENSING

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Context and objectives

The goal of this research project is to adapt the European crop yield forecasting system (CGMS at the JRC Space Applications Institute) for application to Belgium. This will provide the Ministry of Agriculture with a tool for the estimation and prediction of agricultural yields and production on the national level as well as per agricultural region. The Belgian Crop Growth Monitoring System (B-CGMS) will also be useful to evaluate the magnitude of losses caused by extreme climatic conditions.

In the European MARS forecasting system, the output of satellite image processing and crop growth modelling are acquired independently and are subsequently submitted to a spatio-temporal comparison. This B-CGMS project particularly aims at the integrated use of satellite post-processed data together with the crop growth model.

Methodology and results

In a first phase of the project, NOAA-AVHRR data are used to calculate fAPAR (fraction of Absorbed Photosynthetically Active Radiation) for Belgium. The land use data per parcel from the IACS are used to deduce the specific crop reflectance for each agricultural region (spectral unmixing). This allows deriving temporal reflectance or NDVI-profiles for each crop of interest (as shown in figure 1). The fAPAR calculated from these time series per crop are subsequently used in a Monteith approach for the estimation of produced biomass (see figure 2).
In a second phase, the biomass estimates obtained by CGMS, those obtained from satellite data and a time trend function are integrated to come to final yield estimates. It will be investigated whether PAR-absorption as observed from space can be used to establish a new methodology in yield forecasting (combination of the growth model and remote sensing) and enhance the accuracy of agricultural yield estimates.

In a last phase *f*APAR series will be calculated from SPOT-VEGETATION images instead. The impact of changing from one sensor (AVHRR) to another (VEGETATION) will be evaluated by comparing the uncertainties in yield prediction and production estimates.

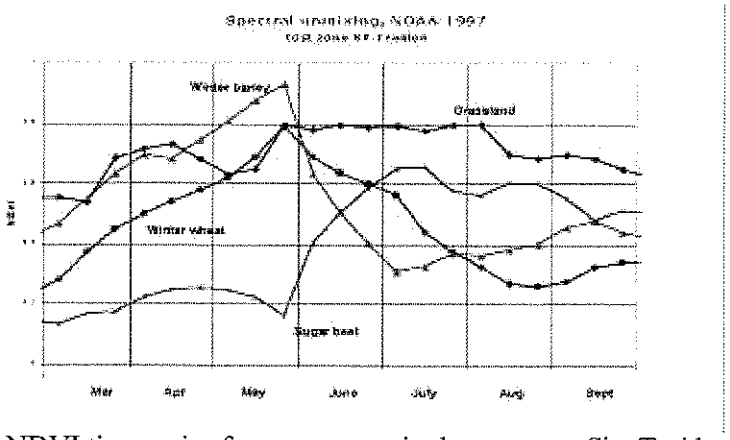

Figure 1: NDVI time series for some crops in the test zone Sint Truiden (1997)

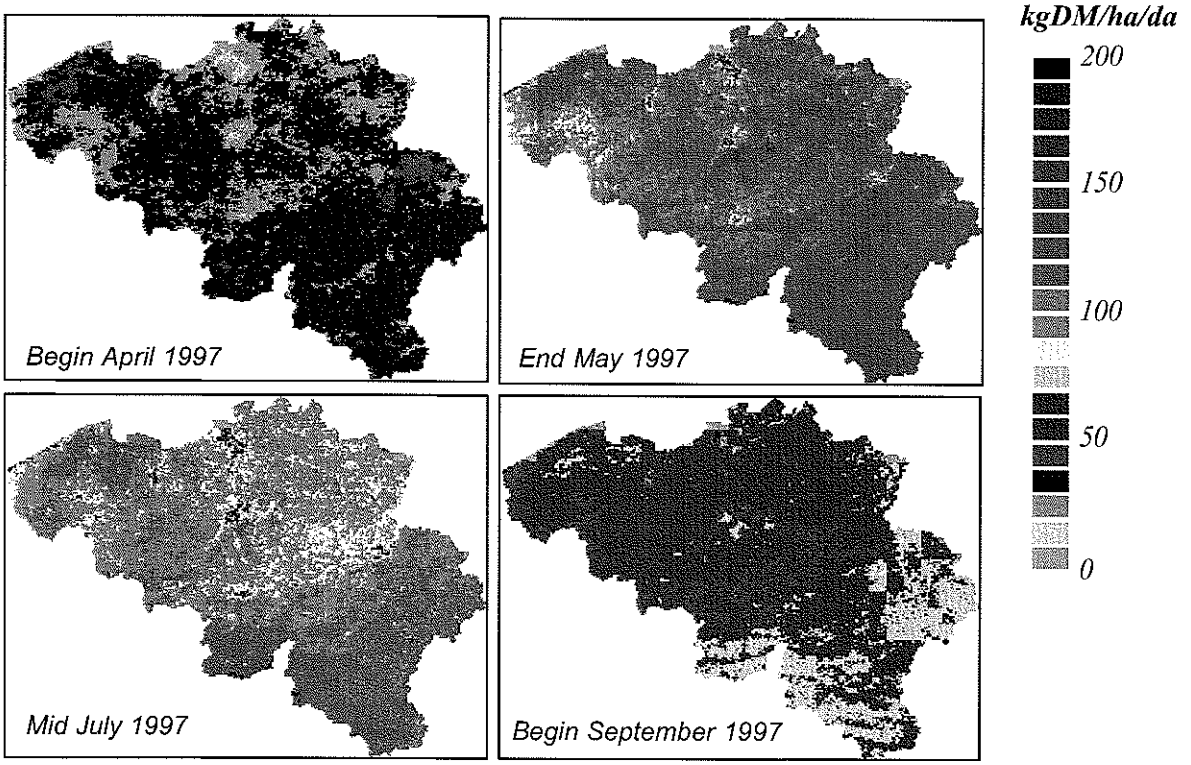

Figure 2: Dry matter productions, estimated with the Monteith approach with fAPAR from NOAA-AVHRR and meteorological data from the B-CGMS database.

Contracts

The project is co-sponsored by the the Ministery of Agriculture, the Belgian Federal Office for Scientific, Technical and Cultural Affairs (OSTC) and by Vito.

The project is executed in collaboration with the Fondation Universitaire Luxembourgeoise (FUL, Arlon) and the Centre de Recherches Agronomiques (CRA, Gembloux).

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