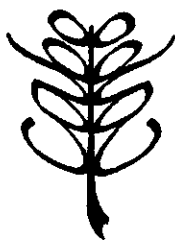


AGRISCATT 88 GROUND DATA COLLECTION FLEVOLAND (NL)

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CONTENTS

	SUMMARY/SAMENVATTING	1
	PREFACE	3
1	INTRODUCTION	5
2	TRIAL DESCRIPTION	7
2.1	Test site	7
2.2	Measurement programme	10
3	METEOROLOGICAL PARAMETERS	13
3.1	Data acquisition	13
3.2	Weather conditions during the campaign	14
4	COLLECTION OF DATA ON SOIL CHARACTERISTICS	15
4.1	Methodology of the intensive survey	15
4.1.1	Soil moisture	15
4.1.2	Soil surface roughness	16
4.2	Data summary	17
5	COLLECTION OF DATA ON VEGETATION	19
5.1	Methodology of the intensive crop survey	19
5.1.1	Cereals	19
5.1.2	Sugar beet	21
5.1.3	Potato	23
5.1.4	Bean	23
5.2	Conditions during sorties	24
5.2.1	Sortie 1, 22-04-88	24
5.2.2	Sortie 2, 02-05-88	25
5.2.3	Sortie 3, 14-06-88	26
5.2.4	Sortie 4, 05-07-88	27
5.2.5	Sortie 5, 14-07-88	29
5.2.6	Sortie 6, 26-07-88	30
5.2.7	Sortie 7, 16-08-88	31
5.3	Extensive field observations	33
6	DATA BASE EXTENSION	36
7	RESULTS AND DISCUSSION	40
	REFERENCES	46

LIST OF FIGURES

- 2.1 Flevoland
- 2.2 The Agriscatt test site showing individual parcels and the flightlines of DUTSCAT and ERASME
- 2.3 The subdivision of the test site parcels into reference fields
- 7.1 Volumetric soil moisture content of the upper 5 cm top soil of the potato fields during the Agriscatt 1988 sorties
- 7.2 Volumetric soil moisture content of the upper 5 cm top soil of the sugar beet fields during the Agriscatt 1988 sorties
- 7.3 Volumetric soil moisture content of the upper 5 cm top soil of the wheat and barley fields during the Agriscatt 1988 sorties
- 7.4 Above-ground, dry biomass of potato during the Agriscatt 1988 sorties
- 7.5 Above-ground, dry biomass of sugar beet during the Agriscatt 1988 sorties
- 7.6 Above-ground, dry biomass of wheat and barley during the Agriscatt 1988 sorties
- 7.7 Leaf Area Index (LAI) of potato during the Agriscatt 1988 sorties
- 7.8 Leaf Area Index (LAI) of sugar beet during the Agriscatt 1988 sorties
- 7.9 Leaf Area Index (LAI) of wheat and barley during the Agriscatt 1988 sorties

LIST OF TABLES

- 2.1 Test fields characteristics
- 2.2 Days of radar data collection
- 3.1 Meteorological parameters, averaged for all the overpasses of the seven DUTSCAT sorties.
- 4.1 Overview of soil surface roughness sampling
- 4.2 Parameters of the soil surface
- 5.1 Accuracy of estimation of soil cover

APPENDIX

- I Zadoks's decimal code for the growth stages of cereals 3 pp
- II Soil and vegetation data; print-out of data stored in the Radar Cross Section Data Base 27 pp
- III Parameter list for the RCS Data Base 14 pp

SUMMARY

In 1988 a European airborne radar campaign took place in Flevoland (NL). The objective of the campaign was the simultaneous collection of multi-temporal, multi-frequency, multi-polarization and multi-incidence angle radar backscatter data and ground truth. This report describes the Flevoland test site, the measurement programme and the methodology of the collection of weather, soil and crop data (ground truth). The ground truth is presented in listed numbers and in a general overview of weather, soil and crop conditions during the campaign. This report also presents the structure of the data base in which the ground truth is stored.

SAMENVATTING

In 1988 vond in Zuidelijk Flevoland een Europese radar meetcampagne plaats. Het doel van deze campagne was het tegelijkertijd verzamelen van multi-temporele, multi-frequentie, multi-polarisatie en multi-invalshoeken radarreflectie data en weers-, bodem- en gewasparameters (groundtruth). Dit rapport beschrijft het testgebied in Zuidelijk Flevoland, het meetprogramma en de methodieken voor het verzamelen van de groundtruth. De groundtruth is in dit rapport weergegeven in cijfertabellen en in een overzicht van de toestand van het weer, de bodem en het gewas gedurende de campagne. Daarnaast beschrijft dit rapport de structuur van de databank waarin de groundtruth is opgeslagen.

PREFACE

This report introduces the user of the Radar Cross Section (RCS) Data Base of the European Agriscatt 1988 campaign to the ground truth of the Dutch test site Flevoland. A floppy disk containing the ground truth accompanies this report. The report itself focusses on the programme for collecting ground truth. It does not discuss the technique of radar backscatter measurements or the determination of field average radar backscatter values. The radar data of the 1988 campaign (ERASME, DUTSCAT) will be entered separately into the RCS data base and will be available on floppy disk. At the time of writing this report these data were not yet available.

Ground truth was collected according to the terms set out in a contract between The Netherlands Remote Sensing Board (BCRS) and the Centre for Agrobiological Research (CABO) in The Netherlands (contract No. 44543/AO-2.17). Data on crops and soil moisture were collected by the Centre for Agrobiological Research (CABO) and data on soil surface roughness by the Agricultural University Wageningen (LUW).

The Lake IJssel Polder Development Authority (RIJP) deserves our gratitude for their full cooperation and permission to install corner reflectors in one of their fields and the usage of their laboratories. The knowledge of soil sampling of Ir. J. Stolp of the Soil Survey Institute (STIBOKA) was greatly appreciated. Finally, thanks are due to the farmers in the test area for the usage of their fields for sampling activities.

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1 INTRODUCTION

The Agriscatt 1988 airborne radar campaign was initiated by the European Space Agency (ESA) to elucidate the interaction of microwaves with vegetation and soil surfaces. This campaign is a follow-up on the Agriscatt 1987 campaign. The object of the campaign was the collection of multi-temporal, multi-frequency, multi-polarization and multi-incidence angle radar backscatter data over several test sites in the European community. The following countries participated in the exercise: France (with the 'Coulommiers' site), Germany (with the 'Freiburg' site), Italy (with the 'Florence' site), the Netherlands (with the 'Flevoland' site) and the United Kingdom (with the 'Reedham' and 'Feltwell' sites). During the growing season from April till August 1988, several flights were scheduled above each of the test sites with the Dutch multiband scatterometer DUTSCAT (Delft University of Technology scatterometer, Snoeij & Swart, 1987) and the French forward looking scatterometer ERASME, (Bernard et al. 1986). DUTSCAT radar measurements were taken at six frequencies ranging from 1.2 to 17.25 Ghz, two states of polarization (VV and HH) and various angles of incidence ranging from 10 to 60 degrees. ERASME radar measurements were taken in C-band (HH polarization) and X-band (HH and VV polarization) at two central angles of incidence, 23 and 38 degrees, with a range from 15 to 45 degrees. The targets of interest in the test sites were mainly bare soil, agricultural crops, pasture and woodland.

The collection and storage of ground data during a previous European radar campaign, Agrisar 1986, indicated the desirability of a common radar cross section data base. Therefore, in cooperation with the ESA the JRC initiated the development of EURACS: European Radar Cross Section Data Base. This central data base allows access to the data of all EC test sites. Its objectives and requirements are laid down in the 'RCS data base and data format guide, June 1987'. The reader should refer to this publication for detailed information. For the Agriscatt 1988 campaign the methodology for ground data collection was the same as in the Agriscatt 1987 campaign. When compared with 1987, a somewhat more elaborate programme of collecting ground truth was carried out to support the particular CABO research programme. Therefore, the data base is extended to accommodate the larger set of ground truth parameters. The data set for the Dutch test site was collected as stipulated in a contract between The Netherlands Remote Sensing Board (BCRS) and the Centre for Agrobiological Research (CABO). It

meets the requirements of the RCS data base. The final structure and format of the data was established through discussions with the participating investigators. A floppy disk containing the ground truth of the Flevoland test fields accompanies this report.

In Chapter 2, the reader is introduced to the Flevoland test site and the measurement programme. Meteorological parameters on the days of the radar measurements are given in Chapter 3. In Chapter 4, the methods of collecting ground truth on soil surface roughness and soil surface moisture are described. The collection of ground truth on agricultural crops and a general account of crop development during the campaign are given in Chapter 5. Chapter 6 lists the extensions of the 1988 data base compared with that of the 1987 campaign. Finally, Chapter 7 illustrates some of the results of this campaign and makes a general comparison with the 1987 campaign.

2 TRIAL DESCRIPTION

2.1 Test site

The Dutch test site is the same as that of the Agriscatt 1987 campaign (Stolp et al., 1988). It is located in Southern Flevoland, a polder reclaimed from lake IJssel (Fig. 2.1). The test site is rectangular in shape and measures 11 km x 0.5 km. Its location is given by the point quadrats of the latitude and longitude coordinates of its four corners:

Top left	52 ° 20' N	5 ° 21' E
Top right	52 ° 24' N	5 ° 29' E
Bottom left	52 ° 20' N	5 ° 22' E
Bottom right	52 ° 23' N	5 ° 29' E

The general altitude of the site is 3 metres below sea level (3 m -NAP).



Fig. 2.1 Flevoland

0 3 6 9 12 15 KM

The test site comprises a total of eight parcels, five of which are leased to individual farmers and three are still cultivated by the RIJP (Fig. 2.2). Again these parcels are the same as in the 1987 campaign.

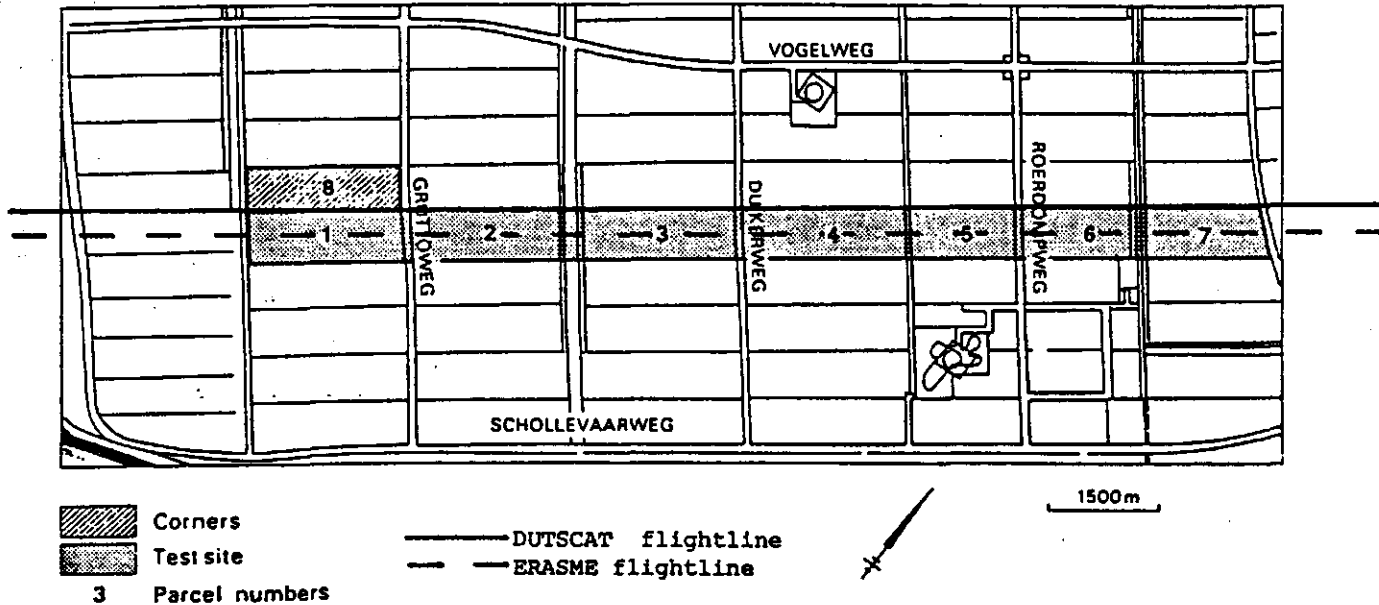
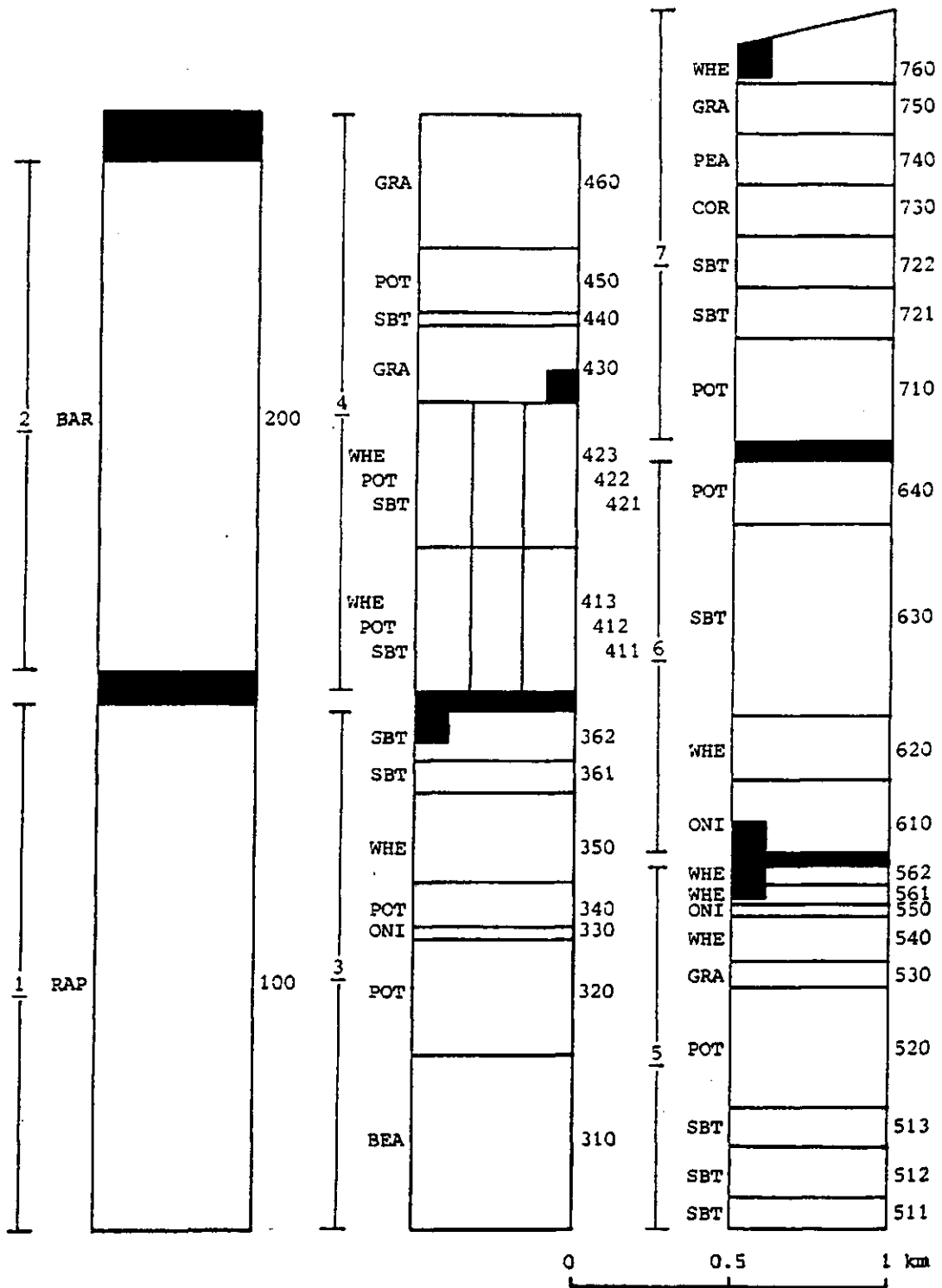


Fig. 2.2 The Agriscatt test site showing individual parcels and the flightlines of DUTSCAT and ERASME.

Individual farmers generally subdivide their parcels into several fields. For the Agriscatt campaign, all fields with a single crop variety within these parcels are called reference fields and have separate field reference numbers. The subdivision of the first seven parcels in the test site is given in Fig. 2.3. Parcel eight was used for the installation of the corner reflectors.

In total, fifteen so-called test fields were selected for ground truth collection from all the reference fields in the test site. During the days of the radar measurements, data on soil surface and vegetation were collected on these fields, in an intensive or extensive survey (Table 2.1).



BEA: Stembean
 BAR: Springbarley
 COR: Corn
 GRA: Grass
 ONI: Onion
 PEA: Pea
 POT: Potato
 RAP: Rapeseed
 SBT: Sugar beet
 WHE: Winterwheat
 ■ : Water, roads and buildings
 762: Field reference number
 4 : Parcel number

Fig. 2.3 The subdivision of the test site parcels into reference fields.

Table 2.1 Test fields characteristics

Field number	Crop type	Location		Field size (m ²)	Ground truth survey	
		Latitude	Longitude		crop	soil
100	RAP	52 ° 20' N	5 ° 22' E	825000	o	o
200	BAR	52 ° 21' N	5 ° 23' E	800000	+	+
310	BEA	52 ° 21' N	5 ° 24' E	275000	+	+
320	POT	52 ° 21' N	5 ° 24' E	180000	+	+
340	BEA	52 ° 21' N	5 ° 25' E	70000	o	o
350	WHE	52 ° 21' N	5 ° 25' E	140000	+	+
362	SBT	52 ° 22' N	5 ° 25' E	80000	+	+
512	SBT	52 ° 22' N	5 ° 27' E	80000	+	+
520	POT	52 ° 22' N	5 ° 27' E	190000	+	+
540	WHE	52 ° 23' N	5 ° 27' E	70000	+	+
710	POT	52 ° 23' N	5 ° 29' E	160000	+	+
722	SBT	52 ° 23' N	5 ° 29' E	80000	+	+
730	COR	52 ° 23' N	5 ° 29' E	80000	o	o
740	BEA	52 ° 23' N	5 ° 29' E	80000	o	o
760	WHE	52 ° 23' N	5 ° 29' E	80000	+	+

+ = intensive survey, o = extensive survey

2.2 Measurement programme

During the Agriscatt campaign, four types of data were collected:

- radar data
 - ground truth
 - weather data
 - reflection data
- Radar data were collected with the Dutch multiband scatterometer DUTSCAT and the French scatterometer ERASME (Table 2.2).

Table 2.2 Days of radar data collection

Sortie	Date	DUTSCAT	ERASME
1	22-04-88	X	
2	02-05-88	X	
3	14-06-88	X	X
4	05-07-88	X	X
5	14-07-88	X	X
6	26-07-88	X	X
7	16-08-88	X	

The flight track of the aircrafts was parallel to the length of the test area (Fig. 2.2).

DUTSCAT radar measurements were made at five different incidence angles (20, 30, 40, 50 and 60 degrees) and in horizontal- and vertical-like polarization, HH and VV respectively. During Sortie 1 and 2, four extra radar measurements were made at two incidence angles, two polarizations: 10 and 15 degrees, HH and VV polarization. The measurements at the six different frequencies were made simultaneously. For all reference fields, the field-average radar backscatter is calculated separately for each frequency, angle of incidence and state of polarization.

ERASME radar measurements were made for two different frequencies, C-band (only HH polarization) and X-band (HH and VV polarization). Because ERASME is a forward looking scatterometer the measurements were made at two central angles of incidence, 23 and 38 degrees. A range from 15 to 45 degrees is obtained by sampling around the two central angles of incidence with intervals of two degrees. For each reference field, the field average radar backscatter will be calculated separately for each frequency, state of polarization and for four angles of incidence (15, 20, 30 and 40 degrees).

- Ground truth on soil surface and vegetation was collected in an intensive or extensive survey.

The extensive survey consisted mainly of visual observations on the status of the crop and of the soil surface. In general, the following parameters were collected: field location; elevation/slope; crop type; crop phenology; crop height; row distance; row direction; plant density; soil cover; visual estimates of soil surface moisture.

The intensive survey collected data on the same parameters as the extensive survey, plus data on the following parameters: fresh and dry weight, and moisture content of various parts of the crop canopy (leaves, leaf blades, leaf stems, ears, stems, pods); Leaf Area Index; decimal code of growth stage; plant diameter; length of ears and ear stems; soil surface roughness; moisture content of several layers of the soil surface. Furthermore, a number of extra parameters were collected this year which were not collected in 1987. These parameters are described in Chapter 6.

- Weather data were collected from a number of meteorological stations in the Flevoland area and from observations in the field during ground data collection. The weather data do not apply to any specific test field but to the whole test site in general.
- Reflection data of the canopy were made with the use of a handheld spectrometer (Uenk, 1982). The spectrometer measured the reflection in the green and the infra-red part of the electromagnetic spectrum. For the green part a filter of 550 nm was used and for the infra-red part a filter of 840 nm was used.

During the growing season of 1988 there were thirteen days on which the reflection was measured (including the days when the radar measurements took place). The fields were the same as for the Agriscatt 1988 campaign. Per field there were about twenty measurements taken in both green and infra-red. These measurements were averaged and the standard deviation was calculated. The field average reflection value can be considered as a true reflection value of the canopy and is expressed in a percentage.

3 METEOROLOGICAL PARAMETERS

3.1 Data acquisition

The weather data are the result of complementary measurements and observations taken at a small meteorological station, investigators in the field and farmers of the test site. At the station, meteorological parameters were collected hourly or daily. Since a sortie generally lasted no more than two hours, the data are presented as average values for all overpasses of one sortie. The following parameters were collected for the RCS data base (Table 3.1).

- Wind speed, wind direction, air temperature, air humidity: averaged over the total flight duration of the overpasses of one sortie (meteorological station).
- Precipitation: calculated from a number of hours prior to the first overpass until the time halfway through the total sortie (meteorological station and farmers observations).
- Direct sunlight: hours sunlight from sunrise until sunset on the day of a sortie (meteorological station).
- Cloud cover: averaged over the total flight duration of the overpasses of one sortie (field observation)

Table 3.1 Meteorological parameters, averaged for all the overpasses of the seven DUTSCAT sorties.

Parameter	Sortie						
	1	2	3	4	5	6	7
Wind speed (m/s)	4	7	6	0	6	4	4
Wind direction (°)	30	180	360	315	270	200	250
Rain 1 h prior (mm)	0	0	0	0	0	0	0
Rain 4 h prior (mm)	0	0	0	2	0	0	0
Rain 12 h prior (mm)	0	0	0	5	5	3	0
Rain 24 h prior (mm)	0	5	0	10	16	8	0
Air temperature (°C)	8	14	17	15	16	16	18
Humidity (%)	55	74	65	93	85	84	50
Direct sunlight (h)	11.1	8.3	13.7	0.7	0.7	0.7	10.4
Cloud cover (%)	5	10	30	100	100	100	25
Mid sortie time (GMT)	10.00	09.20	13.45	08.50	12.00	12.30	09.25

3.2 Weather conditions during the campaign

April was dry and sunny and had normal temperatures. The week preceding Sortie 1, 22-04-88, an amount of rainfall of 10 mm was measured. The day of the sortie itself was dry and sunny.

May was also a sunny month. Merely in the last week, about 30 mm rainfall was measured. The day before Sortie 2, 02-05-88, some rain, approximately 5 mm, had fallen. But the day of the sortie itself was dry and sunny. The soil surface was drying out.

The first week of June brought some rain, approximately 15 mm. The rest of the month, including the day of Sortie 3, 14-06-88, was dry, sunny and rather warm. The last day of June announced, with a rainfall of 24 mm, the bad weather of July.

July was very wet. It rained almost every day with a monthly total of approximately 125 mm. Temperatures were low and the hours of sunshine were few. The days of the sorties 4, 5 and 6, 05-07-88, 14-07-88 and 26-07-88, were all cloudy. However, only on the day of Sortie 6, some rain fell in the morning before the flight. The soil surface and canopy were both wet during all sorties.

The first three weeks of August were dry, sunny and rather warm. In the last ten days, an amount of 60 mm rain had fallen. On the day of Sortie 7, 16-08-88, it was dry and sunny. Both the soil surface and the canopy were dry.

4 COLLECTION OF DATA ON SOIL CHARACTERISTICS

4.1 Methodology of the intensive survey

4.1.1 Soil moisture

Definitions

Volumetric soil moisture content (volume fraction of liquid): the volume of water in a soil sample (determined by loss of weight at 105 °C), divided by the volume of the sample. Unit: dimensionless ($\text{cm}^3.\text{cm}^{-3}$): expressed in percentage ($=\text{value} * 100$).

Gravimetric soil moisture content (wetness): the amount of water in a soil sample (determined by loss of weight at 105 °C drying) divided by the weight of the sample after drying. Unit: dimensionless ($\text{g}.\text{g}^{-1}$); expressed in percentage ($=\text{value} * 100$).

Field sampling

During each flight of DUTSCAT the soil surface of the reference fields in the test site was sampled. Sampling took place at ten sampling sites in each reference field. These sites were situated in the centre of the field parallel to the flight track.

For potato fields the sampling occurred as follows: on Sortie 1, 2, 3 and 4 the soil surface of the different sides of the ridge (east and west side) were sampled separately over the layer 0-5 cm. On Sortie 5, 6 and 7 the samples of the layer 0-5 cm from the different sides of the ridge were bulked. On Sortie 1, 2, 3 and 7 a dry surface layer was present, sampled first and its thickness recorded.

For all the other fields sampling was as follows: on Sortie 1, 4, 5, 6 and 7 the soil surface was sampled over the layer 0-5 cm. On Sortie 2 and 3 the sampling of the soil surface was divided in three layers: 0-1, 1-2.5, 2.5-5 cm. On Sortie 1, 2, 3 and 7 a dry surface layer was present, sampled first and its thickness recorded.

Soil surface moisture content was calculated after drying the samples at 105 °C. After the moisture analysis the following parameters (mean and standard deviation) were calculated per field:

for the dry soil surface layer:

- gravimetric moisture content
- thickness

for the soil surface layers of depth 0-1, 1-2.5, 2.5-5, 0-5 cm:

- gravimetric moisture content
- volumetric moisture content

4.1.2 Soil surface roughness

Definition

RMS (Root Mean Square): The standard deviation of a set of heights of the soil surface with respect to a reference level.

Field sampling

The soil surface roughness of each test field was measured using the spray-board technique. Samples were taken perpendicular and parallel to the main direction of cultivation. During the campaign, the sampling depended on changes of the surface roughness due to cultivation activities or weather influences. Table 4.1 gives an overview of the dates of field sampling.

Table 4.1 Overview of soil surface roughness sampling

Field number	Crop type	Sortie date						
		22-4	02-5	14-6	05-7	14-7	26-7	16-8
350	WHE	+	o	o	o	o	+	o
540	WHE	+	o	o	o	o	o	o
760	WHE	+	o	o	o	o	o	o
200	BAR	+	+	+	o	o	o	o
362	SBT	+	+	o	o	o	o	o
512	SBT	+	+	+	o	o	+	o
722	SBT	+	+	+	o	o	o	o
320	POT	+	+	o	o	o	+	o
520	POT	+	+	o	o	o	+	o
710	POT	+	+	+	+	o	+	o
310	BEA	+	+	+	o	o	o	o
740	PEA	+	+	o	o	o	o	+
730	COR	+	+	o	o	o	+	o

+ = soil surface roughness sampled

o = soil surface roughness not sampled

After sampling the spray profiles were digitized. The digitized profiles were linearized (corrected to the horizontal surface). Then the soil surface roughness was calculated as a field average expressed in RMS for both perpendicular and parallel directions.

4.2 Data summary

Soil surface data for all sorties are presented in appendix II of this report. Table 4.2 gives the field-averaged values of the soil surface moisture content for the depth 0-5 cm, and the RMS values of the perpendicular and parallel surface roughnesses.

Table 4.2 Parameters of the soil surface

A: Volumetric soil moisture content (%)

Field number	Crop type	Sortie date						
		22-4	02-5	14-6	05-7	14-7	26-7	16-8
350	WHE	32.7	27.8	23.5	40.3	42.2	41.7	28.0
540	WHE	32.9	30.4	24.1	40.3	38.1	42.9	31.1
760	WHE	33.9	34.6	26.0	42.8	40.7	45.8	37.4
200	BAR	28.1	18.0	26.8	39.3	40.0	41.4	27.9
362	SBT	31.0	30.4	28.3	44.7	39.4	38.1	24.5
512	SBT	28.5	28.4	33.4	44.9	37.1	43.3	23.1
722	SBT	29.2	26.0	31.5	43.0	39.7	47.4	28.5
320	POT	23.0	19.5	23.0	34.0	35.5	31.6	21.2
520	POT	22.2	16.8	22.2	37.9	33.6	38.4	20.6
710	POT	23.1	22.1	20.5	33.4	32.7	37.3	21.0
310	BEA	25.2	19.7	26.6	39.8	39.1	38.0	26.9

B: Soil surface roughness perpendicular (cm)

Field number	Crop type	Sortie date						
		22-4	02-5	14-6	05-7	14-7	26-7	16-8
350	WHE	0.76	0.76	0.76	0.76	0.76	1.39	1.39
540	WHE	1.15	1.15	1.15	1.15	1.15	1.15	1.15
760	WHE	0.95	0.95	0.95	0.95	0.95	0.95	0.95
200	BAR	2.76	0.79	0.52	0.52	0.52	0.52	0.52
362	SBT	0.68	0.69	0.69	0.69	0.69	0.69	0.69
512	SBT	0.54	0.92	0.84	0.84	0.84	1.47	1.47
722	SBT	0.84	0.87	1.34	1.34	1.34	1.34	1.34
320	POT	3.81	5.79	5.79	5.79	5.79	6.09	6.09
520	POT	4.04	6.08	6.08	6.08	6.08	5.68	5.68
710	POT	3.46	6.24	5.32	5.42	5.32	5.60	5.60
310	BEA	0.70	0.72	0.46	0.46	0.46	0.46	0.46

C: Soil surface roughness parallel (cm)

Field	Crop	Sortie date						
		22-4	02-5	14-6	05-7	14-7	26-7	16-8
350	WHE	0.67	0.67	0.67	0.67	0.67	0.47	0.47
540	WHE	0.62	0.62	0.62	0.62	0.62	0.62	0.62
760	WHE	0.56	0.56	0.56	0.56	0.56	0.56	0.56
200	BAR	1.83	0.58	0.50	0.50	0.50	0.50	0.50
362	SBT	0.51	0.47	0.47	0.47	0.47	0.47	0.47
512	SBT	0.32	0.47	0.56	0.56	0.56	0.56	0.56
722	SBT	0.39	0.53	0.67	0.67	0.67	0.67	0.67
320	POT	0.66	0.54	0.54	0.54	0.54	0.64	0.64
520	POT	0.95	0.81	0.81	0.81	0.81	0.62	0.62
710	POT	0.50	0.58	0.62	0.60	0.62	0.72	0.72
310	BEA	0.50	0.58	0.43	0.43	0.43	0.43	0.43

5 COLLECTION OF DATA ON VEGETATION

5.1 Methodology of the intensive crop survey

5.1.1 Cereals

Field sampling

Ground truth collection in previous campaigns and reports from the Lake IJssel Polder Development Authority indicate a large degree of uniformity in soil surface moisture regime and natural fertility of the soils in the Flevopolder. For field sampling of cereals, five samples of 1 m² each are therefore sufficient for an accurate assessment of field-average crop parameters.

The samples were analyzed in the laboratory. The following parameters were measured in the field:

- Crop height: crop height was averaged over fifteen independent field measurements distributed around the location of the sampling places. The height was measured from the soil surface to the top of the crop canopy (top leaves or ears) in natural position.
- Crop cover and weed cover: These were visually estimated around the sampling locations. The experience of the particular investigator led to the following accuracies of estimation given for the various classes of soil cover (Table 5.1).

Table 5.1 Accuracy of estimation of soil cover

Soil cover class	accuracy
1 - 4%	+/- 1%
5 - 9%	+/- 2%
10 - 19%	+/- 3%
20 - 39%	+/- 4%
40 - 79%	+/- 5%
80 - 89%	+/- 3%
90 - 94%	+/- 2%
95 - 100%	+/- 1%

In three out of four cereal fields (350, 540, 760), an undergrowth of the green manure *Lolium multiflorum* had been sown. This green manure was classified as weed.

- Growth stage: various scales have been developed to quantify the growth stage of cereals, e.g. the Feekes scale and the Zadoks Decimal Code (Zadoks et al., 1974). The latter was chosen because of its finer subdivision into stages of growth (Appendix I). The Decimal Code of the crop was visually determined in the field following the guide-lines given by Tottman et al. (undated).
- Row and plant spacing: all crops in the test area are sown with precision sowing machines. There is no within-field variation in row spacings, but row spacings between fields may vary according to the adjustment of the sowing machine. The row spacing in the field was measured with a tape measure at a number of places. The plant spacing within the rows was also measured with a tape measure at several places.
- The inclination of the upper canopy leaves was visually estimated.

Laboratory analyses

- Canopy biomass and moisture content: the fresh weight of all samples was measured either immediately upon arrival in the laboratory or after one night in a cool store. The samples from one field were then mixed and a subsample of about 0.5 kg fresh weight was taken for the determination of fresh and dry biomass and the moisture content of the ears, stems and leaves. Since these parameters were only determined in one subsample, no standard deviation could be calculated. Research results at the CABO, however, indicate that the spatial variation in dry matter content within a field is very small, about 1 %. The moisture content was calculated from:

$$\text{moisture content} = 100 * (1 - \text{dry weight/fresh weight}) \%$$

- Number of stems: all stems of each sample of 1 m² were counted, but only after flowering had taken place. Before flowering, not all stems are viable and many stems die and disappear during vegetative growth.

- Dimension and number of leaves, ears and chaff needles: these parameters were measured on fifteen stems taken from the five field samples. The length of the flag leaf was measured from its point of attachment to the stem to its tip, flattened out across a ruler. The width of the flag leaf was measured across the broadest part of the leaf. The top leaf of a plant was always taken as the flag leaf. Therefore it can happen, especially in barley, that the flag leaf of a fully developed plant is smaller than the flag leaf of a plant still in its vegetative period of growth. The length of the ear stem was measured from the point of attachment of the flag leaf to the beginning of the ear. The length of the chaff needles was measured from the top of the ears to the tip of the needles. The number of leaves per plant only included green and yellow leaves. Dry, withered and brown leaves (if present) were not taken into consideration.
- Leaf Area Index (LAI): a total of 50 stems was selected from the five field samples. From all leaves the total fresh weight was measured and the total leaf area determined with the 'Leaf Area Meter'. The total LAI for the crop was then calculated from:

$$\text{LAI} = \left[\frac{\text{fresh weight/m}^2}{\text{fresh weight 50 stems}} \right] * \text{leaf area 50 stems}$$

5.1.2 Sugar beet

Field sampling

Five samples were taken in one field. On the first three sorties the above-ground plant material of a row of beet of 2 m length was harvested for analysis in the laboratory. On the last four sorties the total plant, including the underground tuber, was harvested. The following parameters were measured in the field:

- Crop height: as for cereals.
- Crop cover and weed cover: as for cereals.

- Row spacing: in the test area beet is sown with a precision sowing machine in rows 50 cm apart.
- Plant spacing and plant density: all beet plants in a 20 m length of row were counted at four different locations around the sampling places. The plant spacing within the row and the row spacing were used to compute the plant density.
- Plant diameter and leaf dimension: the plant diameter was measured and averaged over twenty plants. This was done until the crop canopy had closed, i.e. until the fifth flight. The leaf dimensions of the largest leaves of the same plants were measured. The length of the leaf was measured from the point where the leaf blade widens out from the leaf stem to the tip of the leaf blade. The width of the leaf was measured across its broadest part.
- The inclination of the upper canopy leaves was visually estimated.

Laboratory analyses

- Canopy biomass and moisture content: all field samples were weighed in the laboratory to determine the fresh biomass. A subsample of the leaf blades, leaf stems (including the largest part of the midrib) and the tuber of about 0.5 kg fresh weight each was taken for the determination of the dry biomass and the moisture content. The number of leaves per plant in all field samples was also counted.
- LAI: the LAI was determined on about 40 leaf blades.

5.1.3 Potato

Field sampling

At five locations in the field, the above-ground plant material of a 2 m row of potato was harvested for analysis in the laboratory. The following parameters were measured in the field:

- crop height: the crop height was measured from the top of the ridges to the top of the canopy. Measurements at twenty individual locations around the sampling places were averaged to give the mean value of crop height.
- Crop cover and weed cover: as for cereals.
- Row spacing: potato in the test area is planted on ridges that are 75 cm apart.
- Plant spacing, plant density and plant diameter: as for sugar beet.
- The inclination of the upper canopy leaves was visually estimated.

Laboratory analyses

- Canopy biomass, moisture content and LAI: as for sugar beet. The LAI was determined on a subsample of leaves of about 0.5 kg fresh weight. Fresh and dry biomass values and moisture content were determined separately for the leaves and stems.

5.1.4 Bean

At five locations in the field, a 2 m row of bean was harvested for analysis in the laboratory. The following parameters were measured in the field:

- Crop height: as for cereals
- Crop cover and weed cover: as for cereals.

- Row spacing was measured with a tape measure at a number of places.
- Plant spacing and plant density: as for sugar beet.

Laboratory analyses

- Canopy biomass, moisture content and LAI: as for sugar beet. The LAI was determined on a subsample of leaves of about 0.5 kg fresh weight. The fresh and dry biomass and the moisture content were determined separately for the leaves, stems and pods.

5.2 Conditions during sorties

5.2.1 Sortie 1, 22-04-88

Cereals:

Field 200: bare, dry soil surface. One diagonal part of the field (25 ha, against the road) lies on winter furrow with 2 % weed cover. The crust is slaked and covered with shells. The rest of the field is harrowed; large clods (2-10 cm diameter).

Field 350: dry soil surface with 10 % slaked crust and drought cracks, and 90 % fine clods. Water logged spots with low emergence of the crop are present on 10 % of the surface area. A thin crop canopy is present on the other 90 %. Leaf inclination: 60-90 ° incidence angle.

Field 540: healthy crop, recently sprayed. Erect leaf inclination: 60-90 ° incidence angle.

Field 760: moist soil surface. Healthy, dry crop. No dead leaf tips. No top leaves. Erect leaf inclination.

Sugar beet:

Field 362: dry soil surface with fine clods (2 cm diameter). Sugar beet are sown, no emergence yet. Field not rolled.

Field 512: as field 362. Field rolled with Cambridge roll, directed north-south.

Field 722: as field 362. 30% of area covered with clods (2-7 cm diameter).

Potato:

Field 320: dry soil surface with fine clods (2-3 cm diameter) and 1% cover of hoed, green sods. Ridges not moulded up. No crop emergence.

Field 520: dry soil surface with 95% fine clods (1-2 cm diameter) and 5% medium clods (4-5 cm diameter). East side of field for 7% covered with grass shoots. Ridges not moulded up. No crop emergence.

Field 710: as field 520 without grass shoots.

Bean:

Field 310: dry soil surface with fine clods (2 cm diameter). Bean sown, field rolled with Cambridge roll. Small gullies 7 cm apart, directed north-south.

5.2.2 Sortie 2, 02-05-88

Cereals:

Field 200: dry soil surface with large clods (2-10 cm diameter). Field hoed. No crop emergence.

Field 350: soil surface for 80% dry and 20% moist. Open spots in canopy with slaked soil surface. Crop in tillering phase. Leaf inclination: 45-90° incidence angle.

Field 540: soil surface for 80% moist; drying between rows. Healthy crop. In places waterdrops on canopy. Erect leaf inclination.

Field 760: wet soil surface. Healthy crop. In places waterdrops on lowest part of canopy. Crop in tillering phase (erect structure). Top leaves mostly folded up. Emergence of sprouts (5 cm high) of sown-through crop.

Sugar beet:

Field 362: dry soil surface with fine clods. Field rolled. Small canopy, two seed leaves. Not all of crop emerged. Leaf inclination of seed leaves horizontal.

Field 512: as field 362 with 1% potato shoots.

Field 722: as field 362 with 2% potato shoots and medium clods.

Potato:

Field 320: dry soil surface with fine clods. Ridges moulded up. No crop emergence.

Field 520: as field 320 with medium clods (4 cm diameter) fallen in furrow.

Field 710: as field 320. West side ridge is slightly moist.

Bean:

Field 310: dry soil surface with fine clods (2 cm diameter). First leaf tips visible, not folded out, erect inclination.

5.2.3 Sortie 3, 14-06-88

Cereals:

Field 200: solid, dry soil surface. Canopy sprayed. Lice in lowest part of canopy. Upper canopy leaves directed to the south. Some top leaves erect.

Field 350: soil surface and canopy dry. Crop is flowering. Slant leaf inclination: 45° incidence angle.

Field 540: as field 350.

Field 760: as field 350. Soil surface cracked.

Sugar beet:

Field 362: soil surface and canopy dry. Large differences in crop height. No potato shoots. Leaf inclination predominantly horizontal.

Field 512: dry soil surface. No weed. Canopy droops slightly due to high solar irradiance. Leaf inclination: 0-90 ° incidence angle.

Field 722: as field 512. Potato shoots are dead but still green. Their height is lower than that of the sugar beet canopy.

Potato:

Field 320: soil surface and canopy dry. Healthy crop. Leaf inclination: 90-95 ° incidence angle.

Field 520: as field 320.

Field 710: as field 320. Lowest part of canopy droops slightly, due to spraying of the crop.

Bean:

Field 310: soil surface and canopy dry. Healthy crop. First flowers appear. Weed appears in some places. Leaf inclination: 0-90 ° incidence angle.

5.2.4 Sortie 4, 05-07-88

Cereals:

Field 200: soil surface and canopy wet. Healthy crop. Chaff needles erect: 0-10 cm above the base of the top leaf. Most of ears burst out of leafsheath. Inclination of top leaves: 90-180 ° incidence angle.

Field 540: soil surface and canopy wet. Lowest leaves are yellowing (more than in field 350). Crop is flowering. Leaf inclination: 45-90 ° incidence angle.

Field 760: as field 540, but lowest leaves are more yellow. Third leaf starts to die.

Sugar beet:

Field 362: soil surface and canopy wet. Erect canopy. Leaf inclination: 30-45 ° incidence angle.

Field 512: soil surface and canopy wet. Healthy, fresh crop. Leaf inclination: 0-30 ° incidence angle.

Field 722: as field 512.

Potato:

Field 320: soil surface and canopy wet. Healthy crop. Start of flowering. Leaf inclination: 90-95 ° incidence angle.

Field 520: as field 320.

Field 710: as field 320.

Bean:

Field 310: soil surface and canopy wet. Healthy crop, fully flowering (flowers on stems). Leaf inclination: 45-60° incidence angle. Leaf margins are curled up (spoonlike).

5.2.5 Sortie 5, 14-07-88

Cereals:

Field 200: soil surface wet. Lowest part of the canopy is yellowing. The ears protrude above the top leaves. Chaff needles are erect and directed toward the north. Some top leaves are yellow. Leaf inclination: horizontal-bent over.

Field 350: soil surface wet. Green canopy, lowest part is slightly yellowing. Start of ripening phase. Inclination of top leaves: 45 ° incidence angle, some leaves are horizontal.

Field 540: the canopy is greener than that of field 350. Lowest part (1/4) is brown. Start of ripening phase. Some lodging of the canopy is present. Inclination of top leaves: 45 ° incidence angle.

Field 760: start of ripening phase. The stems and the upper part of the canopy leaves are green, the rest is brown. Inclination of top leaves: 45-90 ° incidence angle, some leaves are bent over or twisted.

Sugar beet:

Field 362: soil surface and canopy wet. Fresh, green and tall canopy with large leaves. Leaf inclination: 0-45 ° incidence angle.

Field 512: as field 362. Regular growth.

Field 722: soil surface and canopy wet. Slightly irregular growth. Leaf inclination 0-45 ° incidence angle.

Potato:

Field 320: soil surface and canopy wet. Fresh green canopy, somewhat irregular. First flowers open above the canopy. Inclination of top leaves: 30 ° incidence angle. Reet shoots up to 1 m high in some places.

Field 520: soil surface wet. Regular, healthy crop. First flowers open above the canopy. The first leaves in the lowest part of the canopy are turning brown. Inclination of top leaves: 90-100 ° incidence angle.

Field 710: soil surface wet. Healthy, fresh crop. Inclination of top leaves: 90-100 ° incidence angle.

Bean:

Field 310: soil surface and canopy wet. Fully closed canopy with flowers in the upper part and first pods in the lower part. Leaf inclination 45 ° incidence angle. Leaf margins are curled up.

5.2.6 Sortie 6, 26-07-88

Cereals:

Field 200: soil surface moist. Regular, healthy crop. The lowest leaves are yellow/brown, the others are green. Ears directed toward the north, 30-45 ° incidence angle. 60 % of ears is still in the flag leaf. Leaf inclination: 90-135 ° incidence angle.

Field 350: canopy is mature. The stems are still green and the top and second leaf start to turn yellow. The third and fourth leaf are already brown. The canopy lodges in some places. Leaf inclination 0-180 ° incidence angle.

Field 540: flag leaf is still green while 50% of the stems and the rest of the canopy is brown. 50 % of canopy is lodged with stems directed to north-east. Flag leaf inclination: 45 ° incidence angle directed to north-east.

Field 760: main part of canopy is brown. In some places, the upper part of the stems is green. Very thin canopy. Ears erect. All leaves are brown, dried and bent over or twisted.

Sugar beet:

Field 362: soil surface moist. Healthy, green canopy. Large plants with some lice in the head. Leaf inclination: 0-40 ° incidence angle.

Field 512: soil surface moist. Fresh, green canopy. Largest leaves start to droop. The canopy turns yellow in some places. Leaf inclination: 0-45 ° incidence angle.

Field 722: soil surface moist. Fresh canopy with irregular growth (varying crop height). Largest leaves start to droop. Leaf inclination: 0-40 ° incidence angle.

Potato:

Field 320: soil surface moist. Healthy green canopy. Lower part is slightly yellowing. The fully closed canopy starts to collapse into the furrows. Dominant leaf inclination: 90 ° incidence angle (5 % of leaves: 0 ° incidence angle). Reet shoots up to 1 m high in some places.

Field 520: soil surface moist. Lowest part of canopy is yellowing. Leaf inclination: 90-95 ° incidence angle.

Field 710: soil surface moist. Irregular crop height. The canopy has collapsed into the furrows in some places. Lower part of canopy is yellowing. Leaf inclination: 85-95 ° incidence angle.

Bean:

Field 310: soil surface moist. Canopy looks bad: the crop is infected with "leaf speckle" disease. 30 % of stems is leafless and the lowest part of canopy is completely leafless. Stems are erect with pods and in some places still with some flowers. Inclination of top leaves: 0-45 ° incidence angle, curled up.

5.2.7 Sortie 7, 16-08-88

Cereals:

Field 200: soil surface dry and solid with drought cracks. Canopy is ripening but still green. Lower part of stems is yellow/green. All leaves are dead. Ear inclination: 60-90 ° incidence angle. Ears are on the top of the stems, no ear stems.

Field 350: soil surface dry with drought cracks. Canopy dry and mature. Start of harvest at eastern side of the field. All leaves are hanging down the stems. Ear inclination: 0-45 ° incidence angle directed toward the east. Green manure, *Lolium multiflorum* is found in the water logged places in the field.

Field 540: crop harvested. Straw dispersed between the stubbles, in places fully covering the stubble. No bare soil surface is visible. 1 % green manure visible. Stubble inclination: 20 ° incidence angle, directed north-east.

Field 760: crop harvested. Stubble erect, 10 cm high. Straw and stubble cover: 10 %, green manure cover: 5 %.

Sugar beet:

Field 362: soil surface and canopy dry. Healthy, fresh and green crop. Leaf inclination: 0-20 ° incidence angle.

Field 512: as field 362. Large spots of about 8 m diameter with yellowing plants appear in the field.

Field 722: as field 362. Large spots of about 10 m diameter with yellowing plants appear in the field.

Potato:

Field 320: soil surface dry. Green canopy, slightly collapsed with undulating surface. Dominant inclination of top leaves: 90 ° incidence angle (3 % of top leaves: 0 ° incidence angle). Reet shoots up to 1.1 m high in some places.

Field 520: soil surface and canopy dry. Collapsed, undulating canopy with erect plants in some places. Dominant inclination of top leaves: 90 ° incidence angle (10 % of top leaves: 0-90 ° incidence angle).

Field 710: soil surface dry. The canopy has collapsed into the furrows. Undulating surface. Canopy rather green. Leaf inclination: 0-90 ° incidence angle.

Bean:

Field 310: soil surface and canopy dry. Leaves are speckled with brown spots (disease). The lowest part of the canopy is leafless but has green pods. Stems of lowest part of canopy are visible. Leaf inclination: 0-90 ° incidence angle. Leaf margins are curled up (spoonlike).

5.3 Extensive field observations

Apart from the fields on which an intensive measurement programme was carried out, some fields were extensively surveyed: rapeseed (100), pea (340, 740) and maize (730). The following observations and measurements were made: crop cover, weed cover, row spacing, row direction, crop height and anomalies in growth and development (if present).

Rapeseed (100):

Sortie 1: soil surface dry. Erect canopy with flower buds. First flowers are about to open.

Sortie 2: healthy, regular crop. Fully flowering.

Sortie 3: soil surface dry with cracks. Canopy: yellow/brown. Pods: green, 8 cm long. Upper 30-40 cm of stems has pods, the lowest part is bare.

Sortie 4: soil surface and canopy wet. No leaves, only stems and pods. Pods change colour from green to purple. Some reet shoots up in the field.

Sortie 5: soil surface and canopy wet. The crop is harvested and collected in ridges. Stubble: green, erect, 25 cm high. Ridges: 50 cm high. Crop: dry

stems with brown pods, no leaves. Pods: 4-5 cm long, randomly directed.
Soil surface: slaked at stubble, uneven surface.

Sortie 6: as Sortie 5. Straw dried out.

Sortie 7: soil surface dry and cracked. Crop is threshed (lengthwise the field). Stubble erect, totally dried out. The chopped straw lies in rows (2-5 cm high) on the field with the stubble coming through. 15 % rapeseed shoots uniformly over the field. In rows: seedlings of weed, between rows; more mature weed.

Pea (340):

Sortie 1: rough, slaked soil surface with many cracks; winter furrow, and 15 % shoots of rapeseed.

Sortie 2: soil surface dry. Rolled, smooth surface with fine structure. No crop emergence.

Sortie 3: soil surface dry with clods (2-3 cm diameter). Canopy with twines, in places flower buds.

Sortie 4: healthy, open canopy. Mainly flowering.

Sortie 5: soil surface and canopy wet. Erect canopy, in places lodged. Flowering and full with pods.

Sortie 6: soil surface moist. Crop harvested and straw dispersed on the field.

Sortie 7: bare, dry soil surface, hoed. In places straw on the field.

Pea (740):

Sortie 1: soil surface dry, hoed and sown. Sow tracks of 5 cm depth. No crop emergence.

Sortie 2: soil surface dry. Fine structure with larger clods. No crop emergence.

Sortie 3: soil surface dry. Canopy with twines.

Sortie 4: soil surface and canopy wet. Healthy crop, fully flowering.

Sortie 5: soil surface and canopy wet. 75 % of canopy lodged. Canopy flowering and full with pods.

Sortie 6: crop harvested. Field diagonally cultivated. Irregular surface with clods (5-25 cm diameter). 20 % straw on the field.

Sortie 7: soil surface dry and ploughed.

Maize (730):

Sortie 1: soil surface dry, hoed and sown. Sow tracks of 10 cm depth, 1.5-2 m apart. No crop emergence.

Sortie 2: soil surface dry with cloddy structure. No crop emergence.

Sortie 3: soil surface dry. Healthy crop.

Sortie 4: soil surface and canopy wet. Healthy crop.

Sortie 5: soil surface and canopy wet. Healthy, erect canopy with irregular growth.

Sortie 6: soil surface moist, fine structure. Fresh, green canopy. 75 % of canopy with emergence of panicle. Start of flowering.

Sortie 7: dry soil surface. Fresh, green canopy.

No measurements were allowed in the fields 412, 422, 430, 440, 450, 460, 610, 620, 630 and 640. Hence no description of these fields is given in the previous paragraph.

6 DATA BASE EXTENSION

During the collection of ground truth in the 1988 Agriscatt campaign several parameters of soil surface and vegetation were collected which were not defined in the RCS data base. The following parameters were added to the RCS data base in order to update this data base:

For the data base files, CROPWHE.DBF, CROPSBT.DBF, CROPPOT.DBF, CROPBEA.DBF and CROPCOR.DBF:

HARVDATE the date of harvest
YIELD the yield
UCLICOMMEN a comment on the inclination of the leaves of
 the upper canopy

The fieldwidth of the parameter PLANTDENS was changed from 6.0 to 6.2.
The fieldwidth of the parameter NSPP was changed from 6.0 to 6.1.

For the data base file, CROPWHE.DBF:

CHNL the mean length of the chaff needle
CHNLSTDEV the standard deviation of CHNL

For the data base file, CROPSBT.DBF:

PFWTUBER the mean fresh weight of the underground tuber
FTUBERSTDE the standard deviation of PFWTUBER
PDWTUBER the mean dry weight of the underground tuber
DTUBERSTDE the standard deviation of PDWTUBER
PMCTUBER the mean moisture content of the underground
 tuber
MTUBERSTDE the standard deviation of PMCTUBER

For the data base file, CROPPOT.DBF:

VM4_90 the mean volumetric soil moisture content of the
 soil surface layer 0-5 cm of the side of the
 ridge oriented 90 ° of the row direction
VM4_90STD the standard deviation of VM4_90
VM4_270 the mean volumetric soil moisture content of the

	soil surface layer 0-5 cm of the side of the ridge oriented 270 ° of the row direction
VM4_270STD	the standard deviation of VM4_270
GMS_90	the mean gravimetric surface soil moisture content of the side of the ridge oriented 90 ° of the row direction
GMS_90STD	the standard deviation of GMS_90
GMS_270	the mean gravimetric surface soil moisture content of the side of the ridge oriented 270 ° of the row direction
GMS_270STD	the standard deviation of GMS_270
SSTH_90	the mean surface soil thickness of the side of the ridge oriented 90 ° of the row direction
SSTH_90STD	the standard deviation of SSTH_90
SSTH_270	the mean surface soil thickness of the side of the ridge oriented 270 ° of the row direction
SSTH_270STD	the standard deviation of SSTH_270
GM4_90	the mean gravimetric soil moisture content of the soil surface layer 0-5 cm of the side of the ridge oriented 90 ° of the row direction
GM4_90STD	the standard deviation of GM4_90
GM4_270	the mean gravimetric soil moisture content of the soil surface layer 0-5 cm of the side of the ridge oriented 270 ° of the row direction
GM4_270STD	the standard deviation of GM4_270

A new data base file, CROPRAP.DBF, is created for the crop rapeseed. The structure and the parameters of this data base file is the same as the data base file CROPBEA.DBF. Only the fieldwidth of the parameter ABNORMALTI is changed from 25 to 75.

A new data base file, REFLECTI.DBF, was created to hold the reflection parameters of soil surface and vegetation, which were measured during the 1988 Agriscatt campaign. The definition of the parameters in the data base file REFLECTI.DBF is as follows:

FIELDREF	field or property unit number
TIME	the time of reflection measurements
REFL_IR	the mean reflection of soil and/or canopy in the

	infra-red part of the electro-magnetic spectrum
IR_STDEV	the standard deviation of REFL_IR
REFL_GR	the mean reflection of soil and/or canopy in the green part of the electro-magnetic spectrum
GR_STDEV	the standard deviation of REFL_GR
GROU_COND	the condition of the soil surface
CROP_COND	the condition of the canopy
REMARKS	remarks on the field situation or the reflection measurements

All the parameters and data base files described in this paragraph are included in appendix III: parameter list for the RCS data base.

7 RESULTS AND DISCUSSION

The Dutch test site and the methodology of ground truth collection of the Agriscatt 1988 campaign are similar to those of the campaign in 1987. Small differences are only present in the statistics of crop sampling and in the extensions to the data base. The number of sampling places in the field is increased from three to five for all crops, while the size of the samples is decreased for beet, potato and bean from five meter to two meter. Logistic reasons prevented the collection of larger numbers of samples with a still reasonable size. The change in sampling procedure is expected to increase the accuracy of the determination of field-average crop parameters.

The extensions to the data base are listed in Chapter 6. They concern extra crop parameters and measurements of the optical reflection with a portable field-spectrometer. These parameters were measured to support the particular CABO research programme. They are not listed in the RCS data base used in the 1987 campaign. Therefore, new field names and field descriptions which are compatible with the RCS data base requirements, are introduced.

Radar data of the Agriscatt-1988 are not included in this report. Field-average values of the radar backscatter collected with the DUTSCAT and the ERASME will be included in the RCS data base separately. Details on the general execution of the campaign are given by J.C. Morin (1988).

A general overview of some of the ground truth is presented in Figures 7.1 to 7.9. At the first three and at the last sortie, the topsoil was relatively dry with average moisture contents of the 0-5 cm layer between 25 and 35 % for beet and potato. At sorties 4, 5 and 6, the topsoil was relatively wet with moisture contents of about 40-45 % for these crops. The moisture contents of the potato fields are generally some 5 % lower than that of the other crops. This is caused by the specific soil sampling for potato, i.e. at the sides of the ridges. The soil of the ridges is generally dryer than that of the furrows or that of a flat soil surface. Another remarkable feature is the difference between the soil moisture of the barley field (200) and that of the wheat fields (350-760) during the first two sorties. The wheat crops are all winter varieties while the barley crop is a summer variety. The difference in soil moisture content might be attributed to differences in the structure of the soil surface and

the absence of a crop on the barley field. The total variation in moisture content between fields with the same crops averages about 5 %.

The growth of the crops is illustrated by the plots of above-ground biomass and LAI versus time. The data appear consistent and the variation between the fields is small. The biomass value between the potato fields varies least with about 0.05 kg/m^2 . That between the fields of sugar beet with about 0.15 kg/m^2 , and that between the wheat fields with 0.2 kg/m^2 (average values for the whole growing season). The curve of the barley crop is clearly distinguished from those of the wheat crops by its lower level. On the average, the variations between the fields at the end of the growing season average 10-20 % of the total biomass levels. The smoothness and the variation between the curves of the LAI versus time are relatively comparable to those of the biomass versus time. The LAI of the barley crop is larger than that of the wheat crops at the end of the growing season. The wheat crops start to ripe sooner and the LAI thereby decreases faster than that of the barley crop. The general smoothness and similarity of the curves indicate the consistency in the data. The growth and development of the crops in the test site are comparable and no extreme differences are present.

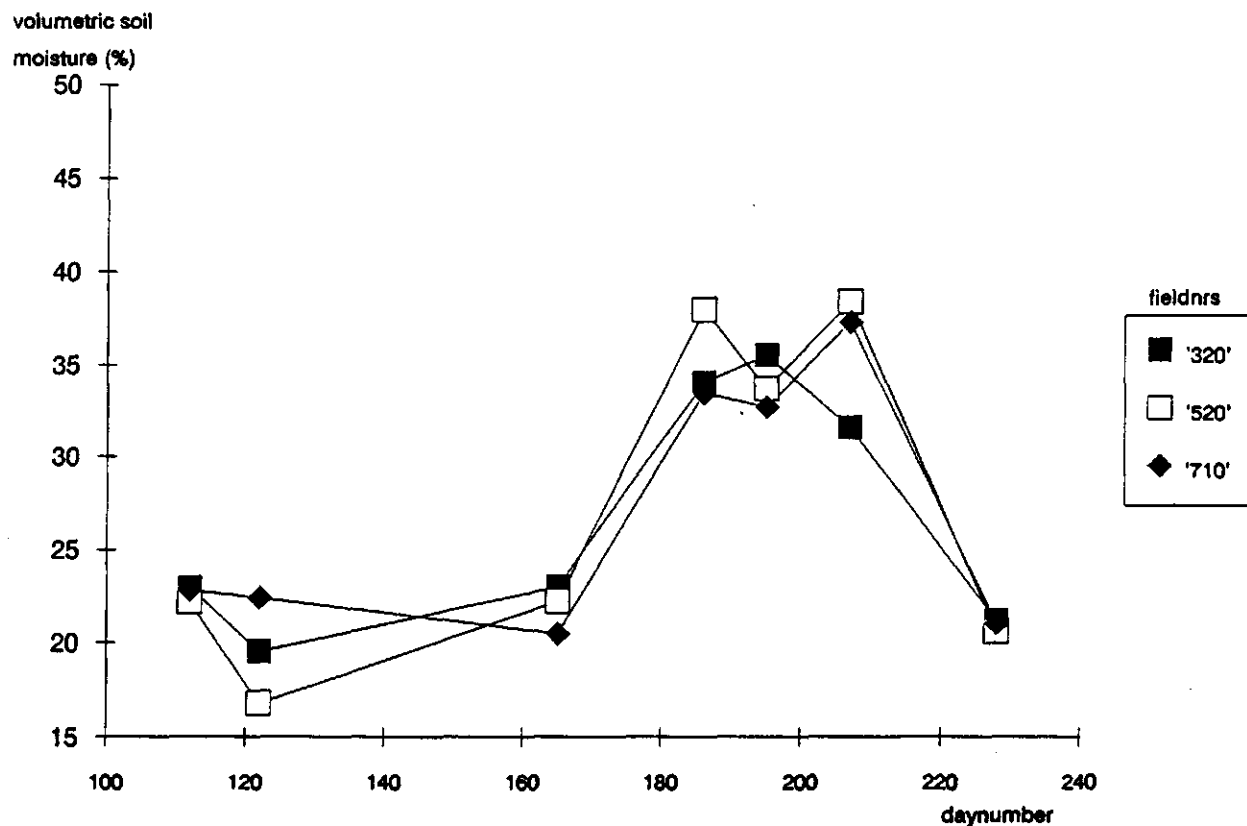


Fig. 7.1 Volumetric soil moisture content of the upper 5 cm top soil of the potato fields during the Agriscatt 1988 sorties

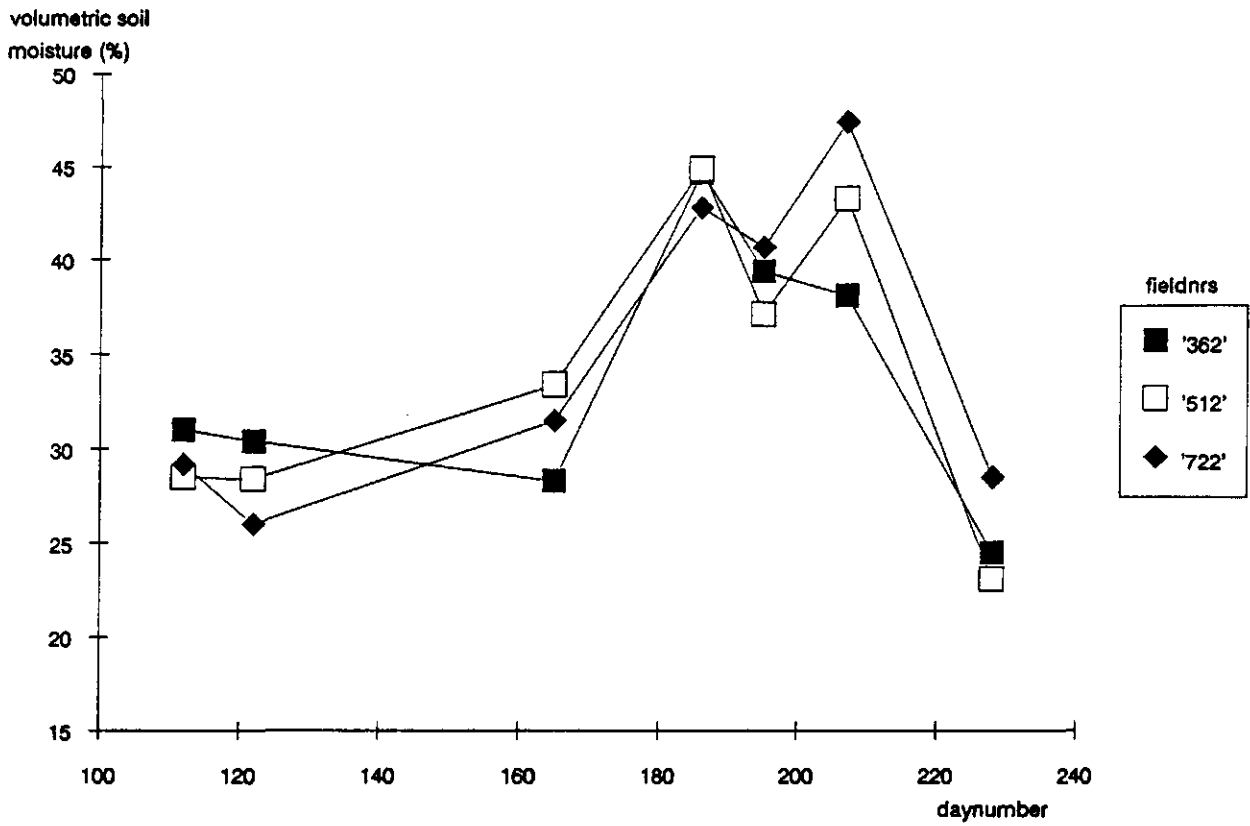


Fig. 7.2 Volumetric soil moisture content of the upper 5 cm top soil of the sugar beet fields during the Agriscatt 1988 sorties

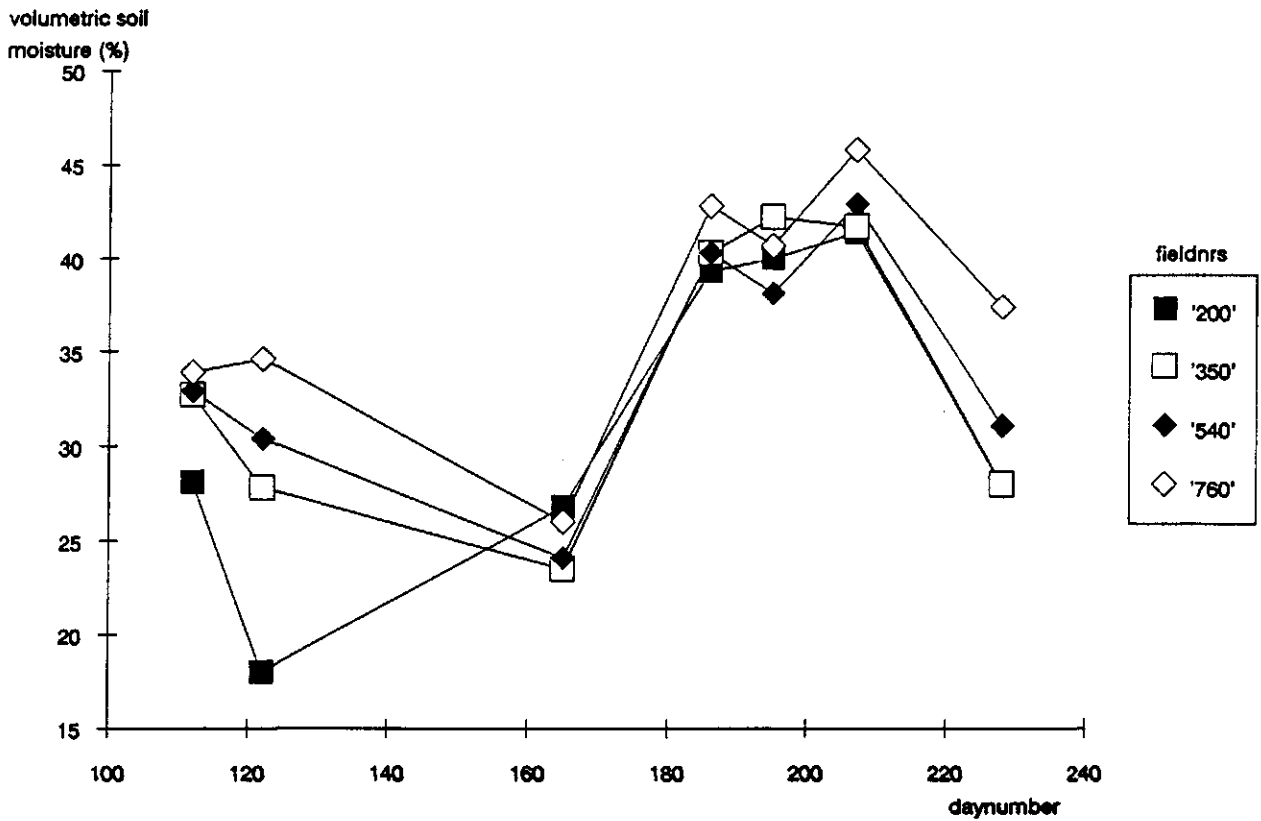


Fig. 7.3 Volumetric soil moisture content of the upper 5 cm top soil of the wheat and barley fields during the Agriscatt 1988 sorties

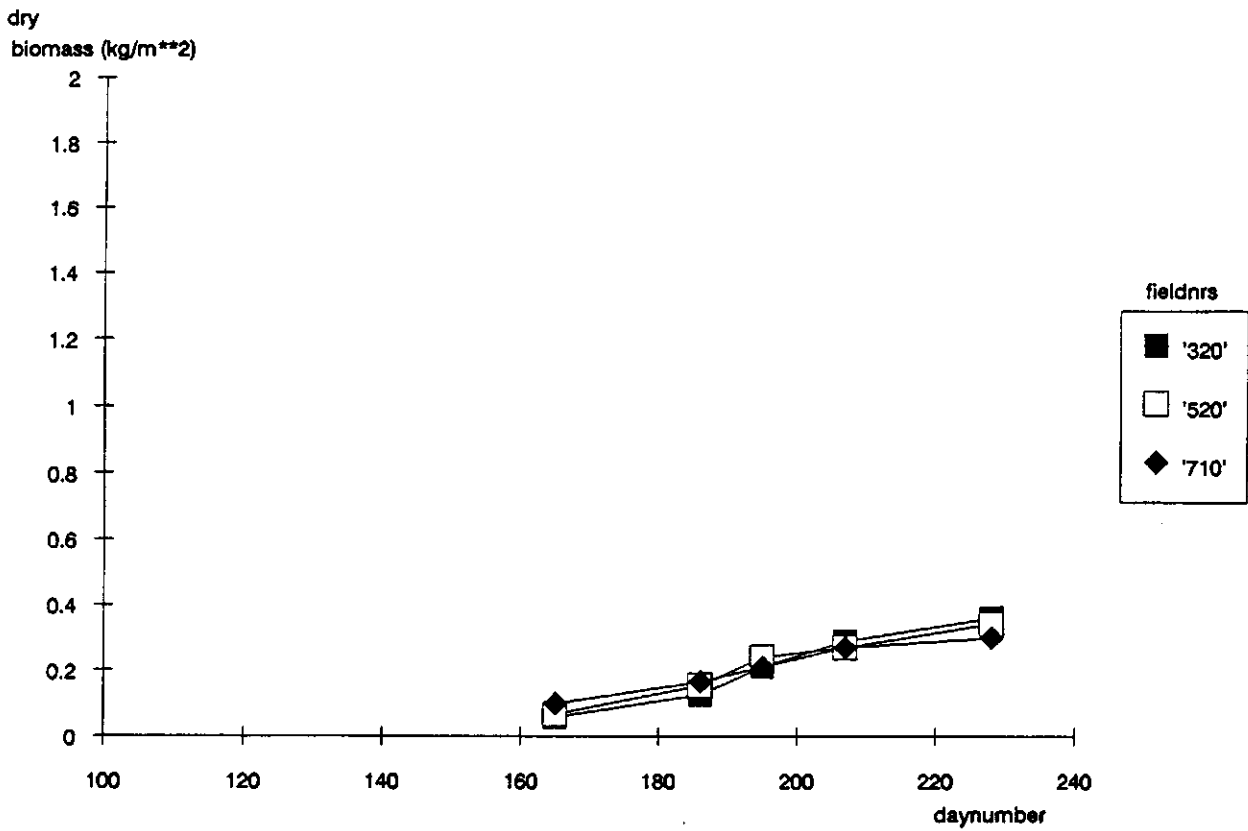


Fig. 7.4 Above-ground, dry biomass of potato during the Agriscatt 1988 sorties

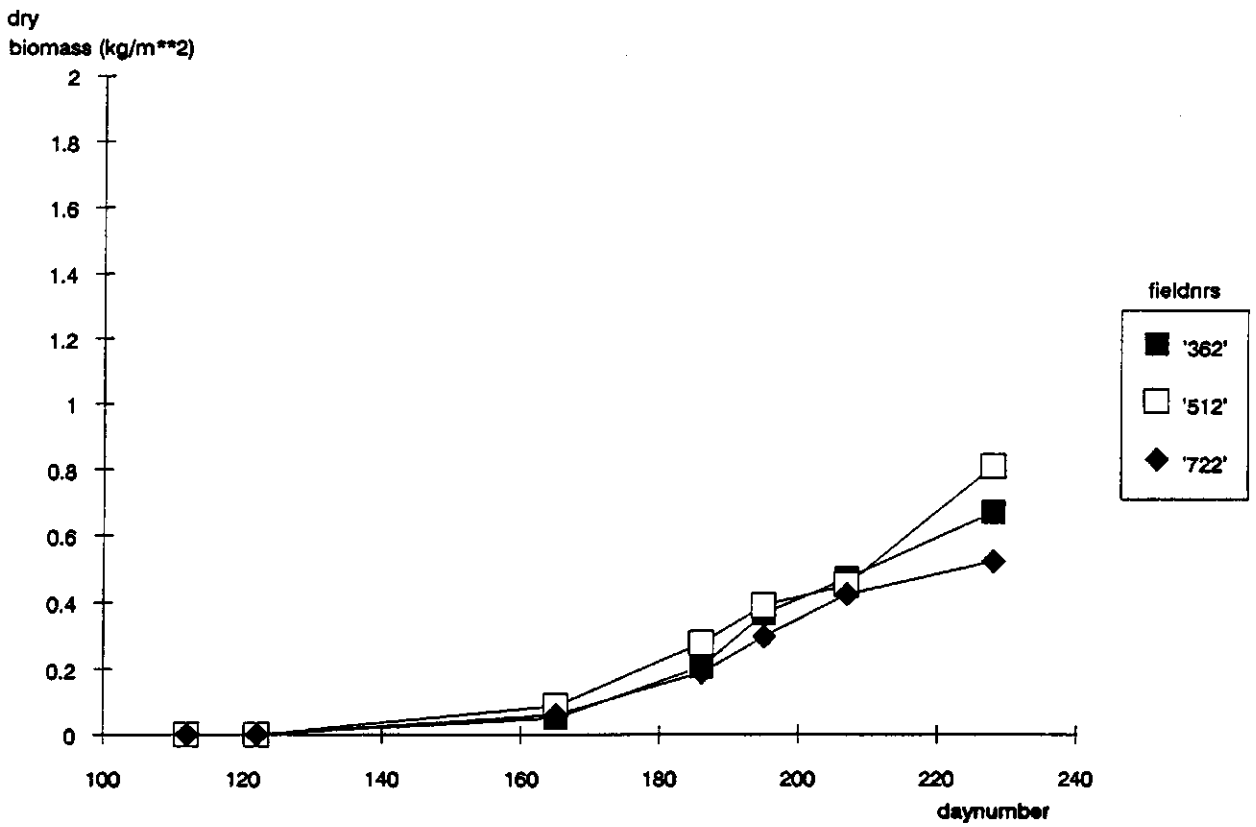


Fig. 7.5 Above-ground, dry biomass of sugar beet during the Agriscatt 1988 sorties

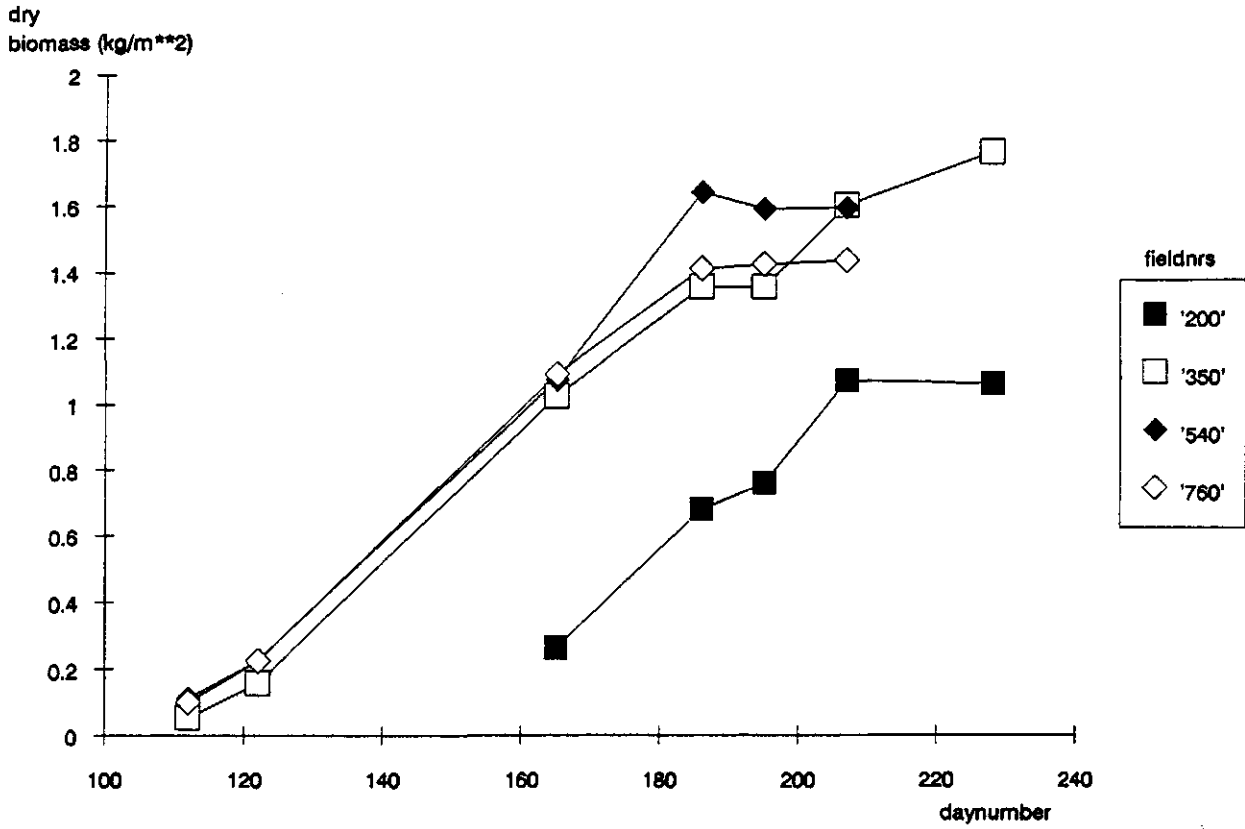


Fig. 7.6 Above-ground, dry biomass of wheat and barley during the Agriscatt 1988 sorties

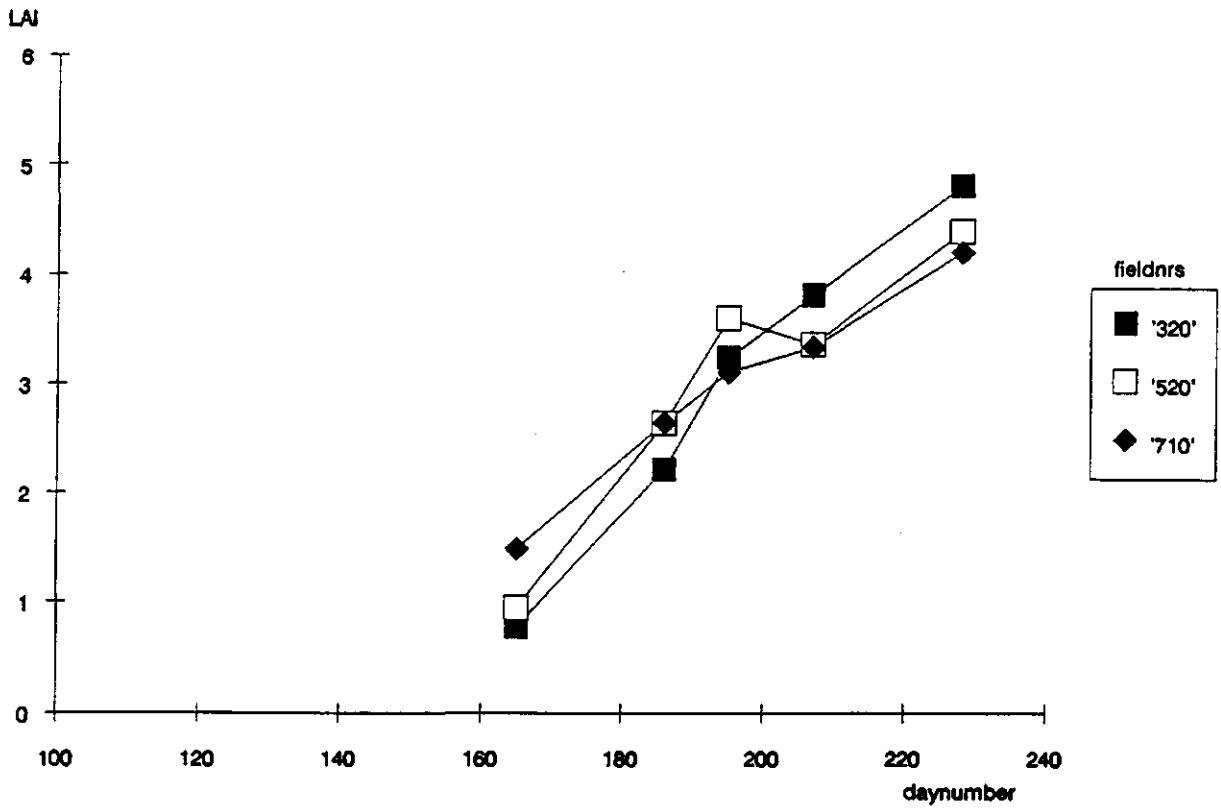


Fig. 7.7 Leaf Area Index (LAI) of potato during the Agriscatt 1988 sorties

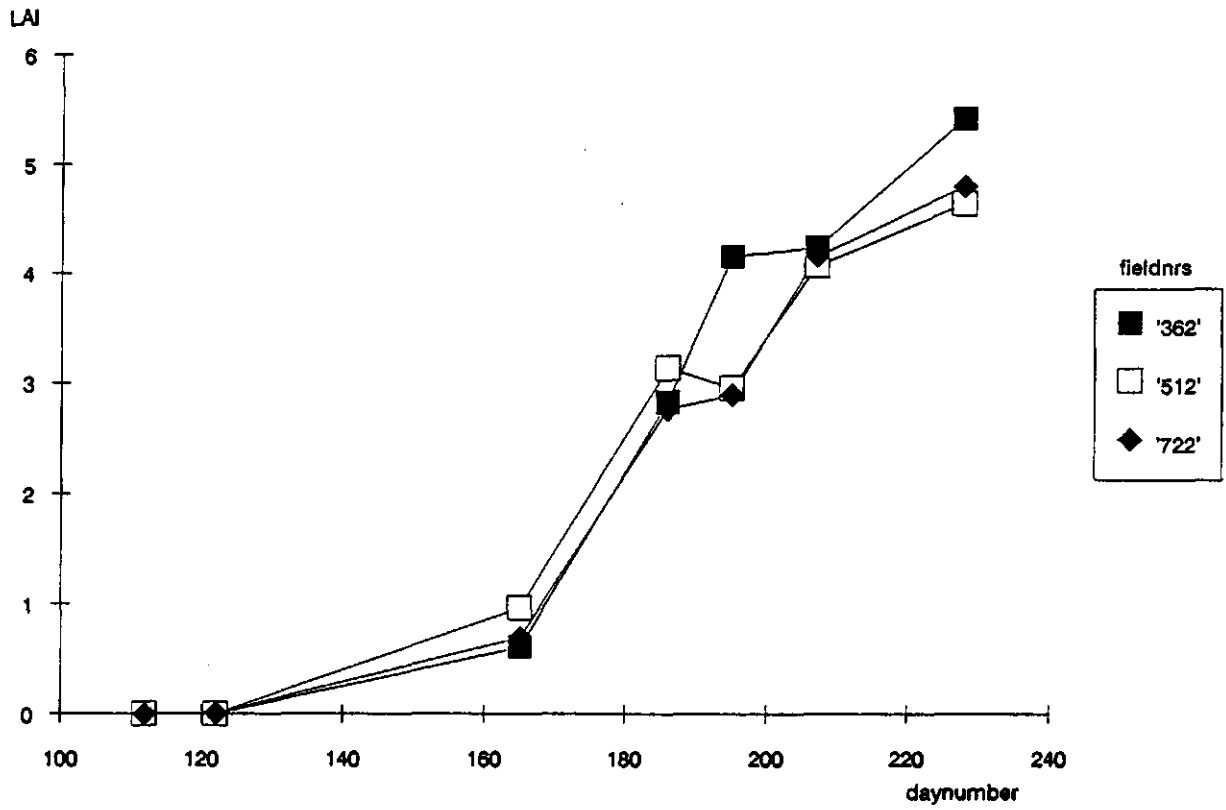


Fig. 7.8 Leaf Area Index (LAI) of sugar beet during the Agriscatt 1988 sorties

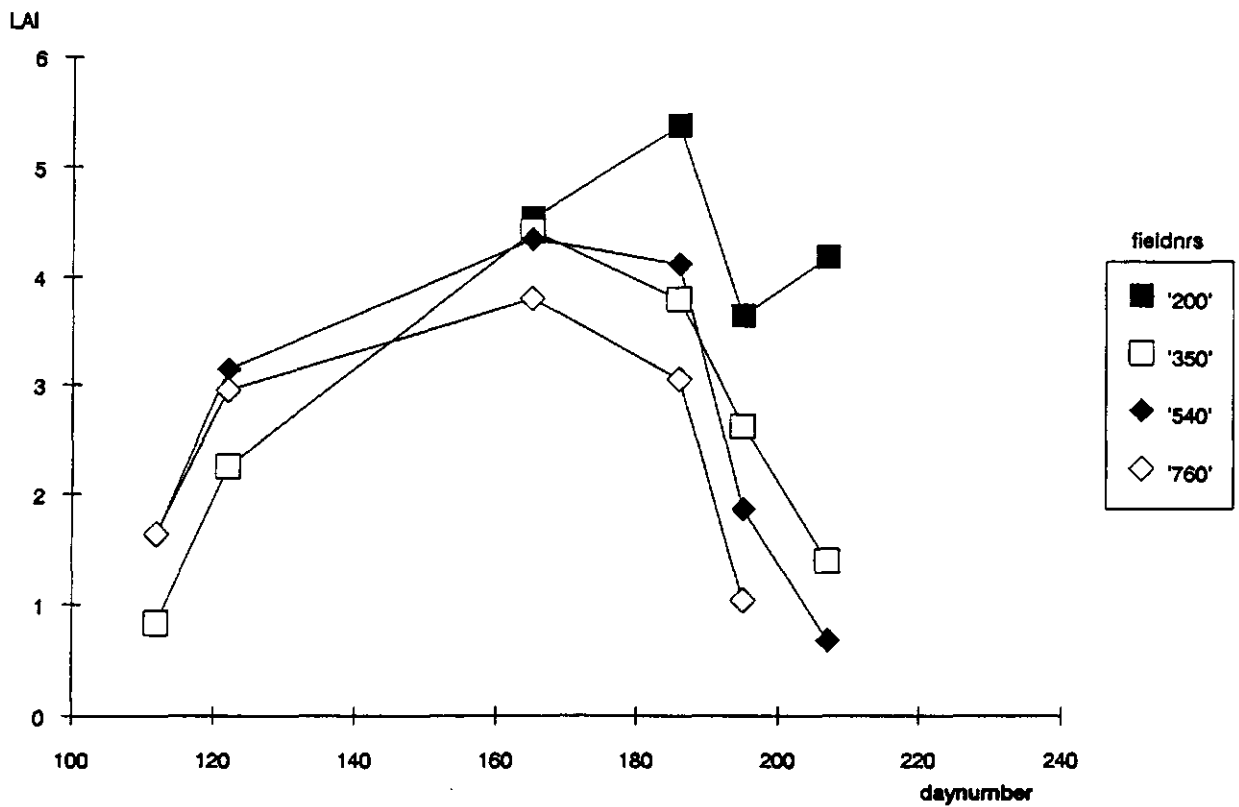


Fig. 7.9 Leaf Area Index (LAI) of wheat and barley during the Agriscatt 1988 sorties

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APPENDIX I

Zadoks' decimal code for the growth stages of cereals

Zadoks' decimal code for the growth stages of cereals

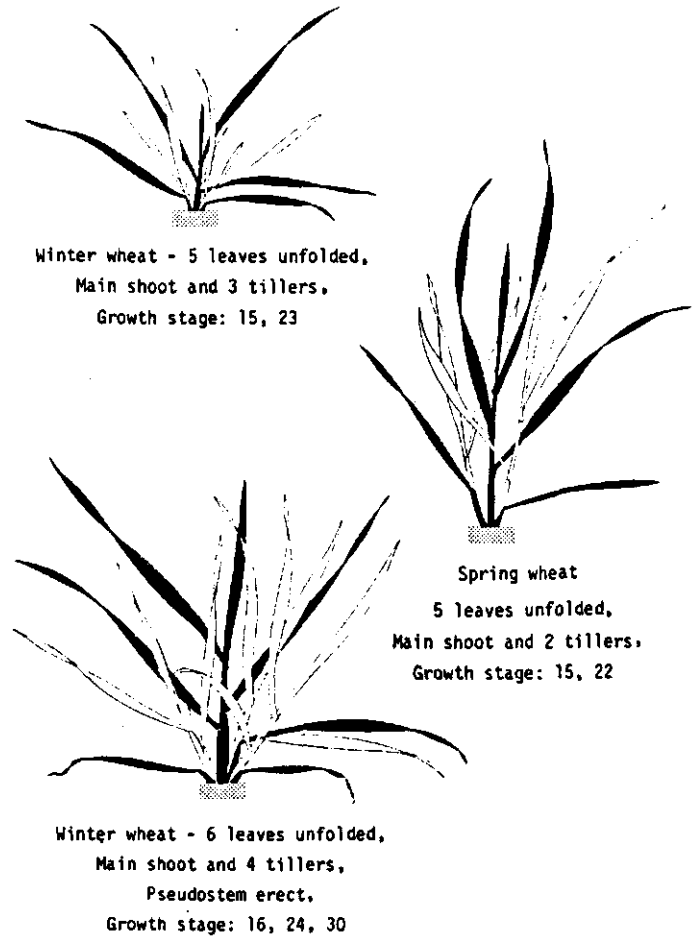
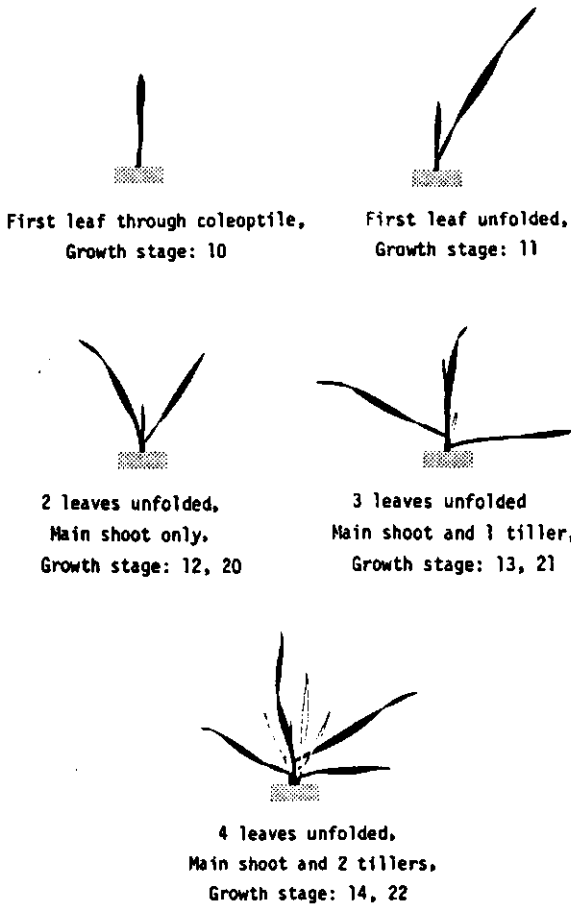
Code		Code	
0	<u>Germination</u>	5	<u>Inflorescence emergence</u>
00	Dry seed	50	*
01	Start of imbibition	51	} First spikelet of inflorescence just visible
02	-	52	} 1/4 of inflorescence emerged
03	Imbibition complete	53	} 1/2 of inflorescence emerged
04	-	54	} 3/4 of inflorescence completed
05	Radicle emerged from caryopsis	55	} Emergence of inflorescence completed
06	-	56	
07	Coleoptile emerged from caryopsis	57	
08	-	58	
09	Leaf just at coleoptile tip	59	
1	<u>Seedling growth</u>	6	<u>Anthesis</u>
10	First leaf through coleoptile	60	} Beginning of anthesis (Not easily detectable
11	First leaf unfolded*	61	} in barley)
12	2 leaves unfolded	62	-
13	3 leaves unfolded	63	-
14	4 leaves unfolded	64	} Anthesis half-way
15	5 leaves unfolded	65	-
16	6 leaves unfolded	66	-
17	7 leaves unfolded	67	-
18	8 leaves unfolded	68	} Anthesis complete
19	9 or more leaves unfolded	69	
2	<u>Tillering</u>	7	<u>Milk development</u>
20	Main shoot only	70	-
21	Main shoot and 1 tiller	71	Caryopsis water ripe
22	Main shoot and 2 tillers	72	-
23	Main shoot and 3 tillers	73	Early milk
24	Main shoot and 4 tillers	74	-
25	Main shoot and 5 tillers	75	Medium milk (Increase in solids of liquid
26	Main shoot and 6 tillers	76	- endosperm notable when
27	Main shoot and 7 tillers	77	Late milk crushing the caryopsis
28	Main shoot and 8 tillers	78	- between fingers)
29	Main shoot and 9 or more tillers	79	-
3	<u>Stem elongation</u>	8	<u>Dough development</u>
30	Pseudo stem erection†	80	-
31	1st node detectable	81	-
32	2nd node detectable	82	-
33	3rd node detectable	83	Early dough
34	4th node detectable	84	-
35	5th node detectable	85	Soft dough (Finger-nail impression not held)
36	6th node detectable	86	-
37	Flag leaf just visible	87	Hard dough (Finger-nail impression held,
38	-	88	- inflorescence losing chlorophyll)
39	Flag leaf ligule/collar just visible	89	-
4	<u>Booting</u>	9	<u>Ripening</u>
40	-	90	-
41	Flag leaf sheath extending	91	Caryopsis hard (difficult to divide by
42	-		thumb-nail)
43	Boots just visibly swollen	92	Caryopsis hard (can no longer be dented by
44	-		thumb-nail)
45	Boots swollen	93	Caryopsis loosening in daytime
46	-	94	Over-ripe, straw dead and collapsing
47	Flag leaf sheath opening	95	Seed dormant
48	-	96	Viable seed giving 50% germination
49	First awns visible	97	Seed not dormant
		98	Secondary dormancy induced
		99	Secondary dormancy lost

* Even code numbers refer to crops in which this stage is reached by all shoots simultaneously and odd numbers to unevenly developing crops when 50% of the shoots are at the stage given.

SEEDLING GROWTH - TILLERING

I-2

SEEDLING GROWTH - TILLERING
- STEM ELONGATION



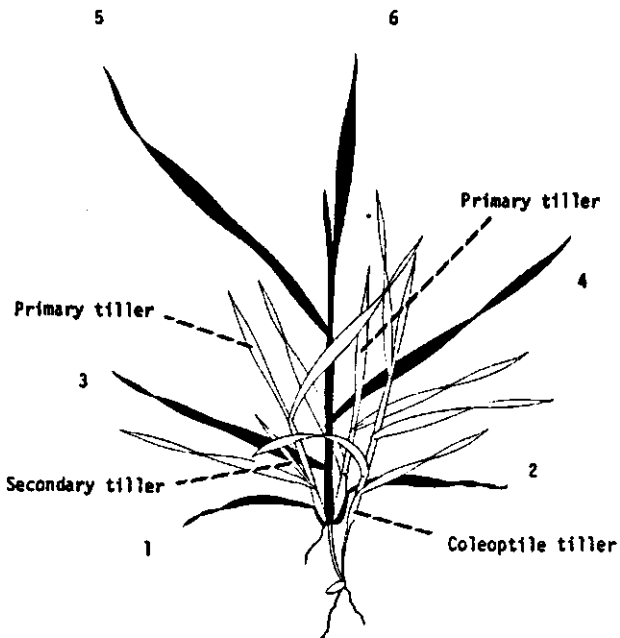
SEEDLING GROWTH - TILLERING

STEM ELONGATION

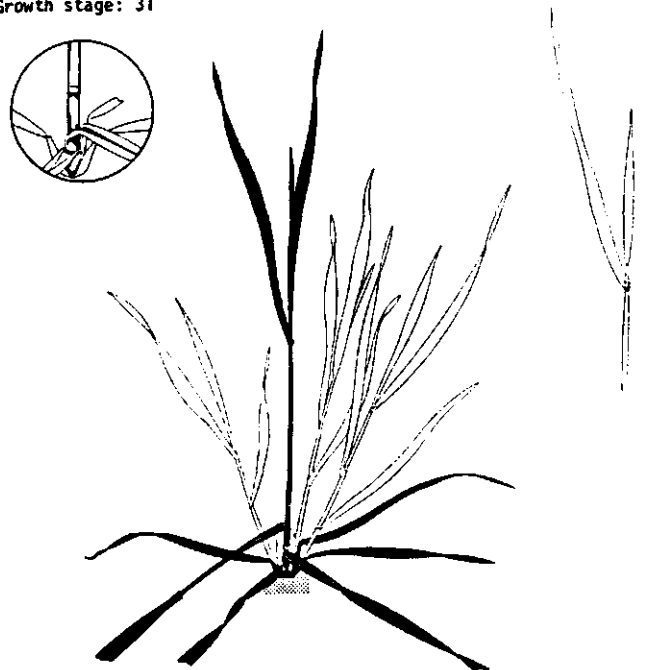
Main stem leaves and tillers

1st node detectable,
Growth stage: 31

Flag leaf ligule visible,
Growth stage: 39



6 leaves unfolded,
Main shoot and 4 tillers,
Pseudostem erect,
Growth stage: 16, 24, 30



8 leaves unfolded,
Main shoot and 3 tillers,
2nd node detectable,
(Leaf sheaths peeled back)
Growth stage: 18, 23, 32

BOOTING

HEADING

Flag leaf sheath extending,
Growth stage: 41

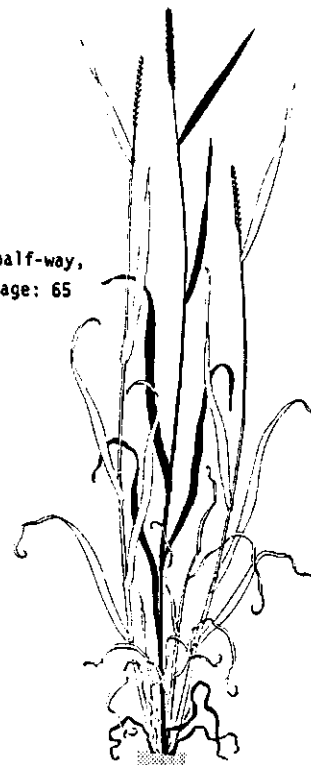
Flag leaf sheath opening,
Growth stage: 47



Main shoot and 4 tillers,
(2 infertile), 4th node detectable,
Boots swollen,
Growth stage: 24, 34, 45



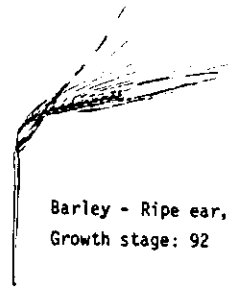
Wheat
Anthesis half-way,
Growth stage: 65



Wheat - Main shoot and 4 tillers,
(2 infertile), 4th node detectable,
Soft dough stage,
Growth stage: 24, 34, 85

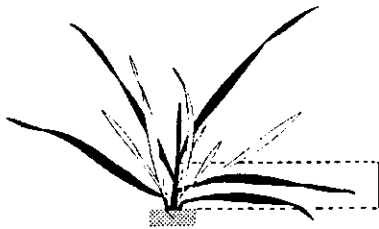


Wheat - Ripe ear,
Growth stage: 92



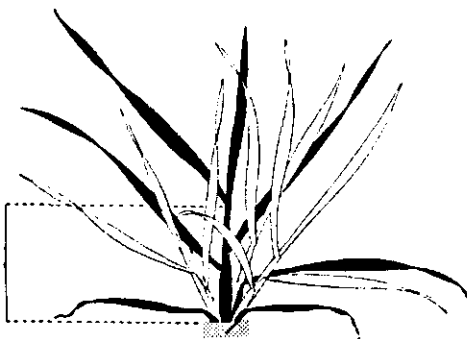
Barley - Ripe ear,
Growth stage: 92

LEAF SHEATH MEASUREMENTS



Leaf sheath
length

Winter wheat - 5 leaves unfolded,
Main shoot and 3 tillers,
Growth stage: 15, 23



Leaf sheath
length
(5 cm +)

Winter wheat - 6 leaves unfolded,
Main shoot and 4 tillers,
Pseudostem erect,
Growth stage: 16, 24, 30

APPENDIX II

Soil and vegetation data; print-out of data stored in the Radar Cross
Section Data Base

STUDYNAME AGRISCAT 2
 EXPDYRMD 880422; 880502; 880614; 880705; 880714; 880726; 880816
 SITEDESCRI FLEVLAND
 FILEDESCRI FIELD DATA
 EXPERNAMEN UENK ; VISSERS
 EXPERINST CABO
 SYSNAME DUTSCAT
 SYSOWNER T.U. DELFT NL
 SYSTYPE COH. PULSE RADAR
 PLATFORM AIRCRAFT
 ANTTYPE 0.9 M DIAMETER PARABOLIC DISH
 LOC TOP 52,20 N 5,21 E 52,24 N 5,29 E
 LOC BOT 52,20 N 5,22 E 52,23 N 5,29 E

FIELDREF	SO SERIES	SOIL TYPE	LOC.FIELD	FIELD SIZE	SLOPE	ANG	SLOPE	DIR	ALTITUDE
FLO100.RAP	CALCERICFLUVISOL	MARINE CLAY	52,20 N 5,22 E	825000	0	0	0	0	-3
FLO200.BAR	CALCERICFLUVISOL	MARINE CLAY	52,21 N 5,23 E	800000	0	0	0	0	-3
FLO310.BEA	CALCERICFLUVISOL	MARINE CLAY	52,21 N 5,24 E	275000	0	0	0	0	-3
FLO320.POT	CALCERICFLUVISOL	MARINE CLAY	52,21 N 5,24 E	1800000	0	0	0	0	-3
FLO340.BEA	CALCERICFLUVISOL	MARINE CLAY	52,21 N 5,25 E	70000	0	0	0	0	-3
FLO350.WHE	CALCERICFLUVISOL	MARINE CLAY	52,21 N 5,25 E	140000	0	0	0	0	-3
FLO361.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,25 E	50000	0	0	0	0	-3
FLO362.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,25 E	80000	0	0	0	0	-3
FLO412.POT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,25 E	75000	0	0	0	0	-3
FLO422.POT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,26 E	20000	0	0	0	0	-3
FLO440.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,26 E	100000	0	0	0	0	-3
FLO450.POT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,26 E	50000	0	0	0	0	-3
FLO511.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,27 E	80000	0	0	0	0	-3
FLO512.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,27 E	60000	0	0	0	0	-3
FLO513.SBT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,27 E	190000	0	0	0	0	-3
FLO520.POT	CALCERICFLUVISOL	MARINE CLAY	52,22 N 5,27 E	70000	0	0	0	0	-3
FLO540.WHE	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,27 E	30000	0	0	0	0	-3
FLO561.WHE	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,27 E	30000	0	0	0	0	-3
FLO562.WHE	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,28 E	100000	0	0	0	0	-3
FLO620.WHE	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,28 E	300000	0	0	0	0	-3
FLO630.SBT	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,28 E	100000	0	0	0	0	-3
FLO640.POT	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,28 E	160000	0	0	0	0	-3
FLO710.POT	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO721.SBT	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO722.SBT	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO730.COR	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO740.BEA	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO740.BEA	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3
FLO760.WHE	CALCERICFLUVISOL	MARINE CLAY	52,23 N 5,29 E	80000	0	0	0	0	-3

Record#	FIELDREF	SPECIES	VARIETY	PHENOLOGY	PHENOCOMME	YIELD	ABNORMALTI	CROPCONDIT
				SOVDATE	HARVDATE			
1	FLO200.BAR.880422	SPRINGBARLEY	FEMINA	999 999 880428	880901	0.5564	999	BARE SOIL
2	FLO200.BAR.880502	SPRINGBARLEY	FEMINA	999 999 880428	880901	0.5564	999	BARE SOIL
3	FLO200.BAR.880614	SPRINGBARLEY	FEMINA	31 999 880428	880901	0.5564	CROP SPRAYED	999
4	FLO200.BAR.880705	SPRINGBARLEY	FEMINA	52 999 880428	880901	0.5564	999	HEALTHY CROP
5	FLO200.BAR.880714	SPRINGBARLEY	FEMINA	65 999 880428	880901	0.5564	999	LOW-LEAVES YELLOW
6	FLO200.BAR.880726	SPRINGBARLEY	FEMINA	76 999 880428	880901	0.5564	999	REGULAR CROP
7	FLO200.BAR.880816	SPRINGBARLEY	FEMINA	90 999 880428	880901	0.5564	ALL LEAVES DEAD	CROP YELLOW
8	FLO350.WHE.880422	WINTERWHEAT	OBELISK 12	999 871020	880816	0.8400	DROWNED PLACES IN FIELD	HEALTHY CROP
9	FLO350.WHE.880502	WINTERWHEAT	OBELISK 15	999 871020	880816	0.8400	OPEN PLACES IN CROP	999
10	FLO350.WHE.880614	WINTERWHEAT	OBELISK 52	999 871020	880816	0.8400	OPEN PLACES WITH GRASS	FLOWERING CROP
11	FLO350.WHE.880705	WINTERWHEAT	OBELISK 77	999 871020	880816	0.8400	OPEN PLACES WITH GRASS	999
12	FLO350.WHE.880714	WINTERWHEAT	OBELISK 78	999 871020	880816	0.8400	OPEN PLACES WITH GRASS	START RIPENING
13	FLO350.WHE.880726	WINTERWHEAT	OBELISK 78	999 871020	880816	0.8400	SOME LODGING	999
14	FLO350.WHE.880816	WINTERWHEAT	OBELISK 92	999 871020	880816	0.8400	OPEN PLACES WITH GRASS	DRY AND WITHERED
15	FLO540.WHE.880422	WINTERWHEAT	OBELISK 13	999 871028	880810	0.9100	CROP SPRAYED	HEALTHY CROP
16	FLO540.WHE.880502	WINTERWHEAT	OBELISK 24	999 871028	880810	0.9100	999	HEALTHY CROP
17	FLO540.WHE.880614	WINTERWHEAT	OBELISK 52	999 871028	880810	0.9100	999	FLOWERING CROP
18	FLO540.WHE.880705	WINTERWHEAT	OBELISK 77	999 871028	880810	0.9100	999	FLOWERING CROP
19	FLO540.WHE.880714	WINTERWHEAT	OBELISK 78	999 871028	880810	0.9100	SOME LODGING	999
20	FLO540.WHE.880726	WINTERWHEAT	OBELISK 78	999 871028	880810	0.9100	SOME LODGING	999
21	FLO540.WHE.880816	WINTERWHEAT	OBELISK 999	999 871028	880810	0.9100	HARVESTED	STUBBLE
22	FLO760.WHE.880422	WINTERWHEAT	OBELISK 13	999 871020	880808	0.8250	999	HEALTHY CROP
23	FLO760.WHE.880502	WINTERWHEAT	OBELISK 24	999 871020	880808	0.8250	999	HEALTHY CROP
24	FLO760.WHE.880614	WINTERWHEAT	OBELISK 52	999 871020	880808	0.8250	999	CROP FLOWERING
25	FLO760.WHE.880705	WINTERWHEAT	OBELISK 77	999 871020	880808	0.8250	LOWER LEAVES YELLOWING	CROP FLOWERING
26	FLO760.WHE.880714	WINTERWHEAT	OBELISK 80	999 871020	880808	0.8250	LOWER LEAVES BROWN	START RIPENING
27	FLO760.WHE.880726	WINTERWHEAT	OBELISK 82	999 871020	880808	0.8250	ALL LEAVES BROWN	ALMOST RIPENED
28	FLO760.WHE.880816	WINTERWHEAT	OBELISK 999	999 871020	880808	0.8250	HARVESTED	STUBBLE

Record#	WCOVSTDEV	PLANTSPAC	TLDNSTDEV	ROWDIR	CRCOVSTDEV	PFWEARS	FLEAVSTDEV	FSTEMSTDEV
GROUNDCOND	WEEDCOVCOM	PLSPSTDEV	ROWDIR	CROPCOVER	CROPHRIGHT	PFWEARS	FLEAVSTDEV	FSTEMSTDEV
	WEEDCOVER	ROWSPAC	TILLDENS	CROPCOVER	CROPHRIGHT	PFWEARS	FLEAVSTDEV	FSTEMSTDEV
1	DRY	0 999 999 99.99 99.99 999 9999999 999	55	0 999	0.000 999	99999.999 999 99999.999 999 99999.999 999	9999.999 999 99999.999 999	9999.999 999
2	DRY	0 999 999 99.99 99.99 999 9999999 999	55	0 999	0.000 999	99999.999 999 99999.999 999	9999.999 999 99999.999 999	9999.999 999
3	DRY	0 999 999 99.99 99.99 999 9999999 999	55	93 A 2	0.333 S 0.026	99999.999 999 99999.999 999	1.037 999	0.875 999
4	WET	0 999 999 99.99 99.99 999 9999999 999	55	96 A 1	0.780 S 0.035	0.461 999	1.171 999	2.209 999
5	WET	0 999 999 99.99 99.99 999 576 S 61.7	55	95 A 1	0.903 S 0.031	0.642 999	0.897 999	2.094 999
6	WET	0 999 999 99.99 99.99 999 665 S 79.0	55	70 A 5	0.829 S 0.034	1.180 999	0.615 999	1.882 999
7	DRY	0 999 999 99.99 99.99 999 9999999 999	55	80 A 3	0.805 S 0.041	0.882 999 99999.999 999	1.440 999	9999.999 999
8	WET	0 999 999 0.14 99.99 999 9999999 999	145	25 A 4	0.115 S 0.029	99999.999 999 99999.999 999	0.552 999	0.240 999
9	MOIST	0 999 999 0.14 99.99 999 9999999 999	145	45 A 5	0.185 S 0.025	99999.999 999	0.887 999	2.741 999
10	DRY	0 999 999 0.14 99.99 999 9999999 999	145	97 A 1	0.856 S 0.035	0.644 999	0.700 999	2.392 999
11	WET	0 999 999 0.14 99.99 999 9999999 999	145	95 A 1	0.899 S 0.039	1.565 999	0.688 999	2.208 999
12	WET	0 999 999 0.14 99.99 999 471 S 41.1	145	93 A 2	0.890 S 0.025	1.679 999	0.379 999	1.931 999
13	WET	0 999 999 0.14 99.99 999 479 S 42.6	145	70 A 5	0.864 S 0.075	1.722 999	0.379 999	1.931 999
14	DRY	0 999 999 0.14 99.99 999 9999999 999	145	60 A 5	0.832 S 0.040	1.283 999 99999.999 999	1.393 999	9999.999 999
15	MOIST	0 999 999 0.19 99.99 999 9999999 999	145	40 A 5	0.223 S 0.027	99999.999 999 99999.999 999	0.690 999	0.474 999
16	MOIST	0 999 999 0.19 99.99 999 9999999 999	145	55 A 5	0.308 S 0.024	99999.999 999	0.864 999	2.649 999
17	DRY	0 999 999 0.19 99.99 999 9999999 999	145	95 A 1	0.988 S 0.039	0.567 999	0.764 999	2.625 999
18	WET	0 999 999 0.19 99.99 999 9999999 999	145	92 A 2	0.928 S 0.012	1.734 999	0.566 999	2.077 999
19	WET	0 999 999 0.19 99.99 999 465 S 36.1	145	90 A 2	0.981 S 0.026	1.767 999	0.566 999	2.077 999
20	MOIST	0 999 999 0.19 99.99 999 429 S 56.2	145	80 A 3	0.685 S 0.192	1.660 999	0.239 999	1.693 999
21	DRY	0 999 999 0.19 99.99 999 9999999 999	145	99 999	99 999 999	99999.999 999 99999.999 999	9999.999 999	9999.999 999
22	SLIGH	0 999 999 0.16 99.99 999 9999999 999	145	50 A 5	0.242 S 0.032	99999.999 999 99999.999 999	0.662 999	0.494 999
23	MOIST	0 999 999 0.16 99.99 999 9999999 999	145	63 A 5	0.319 S 0.028	99999.999 999	0.763 999	2.447 999
24	DRY	0 999 999 0.16 99.99 999 9999999 999	145	97 A 1	0.947 S 0.035	0.566 999	0.733 999	2.189 999
25	WET	0 999 999 0.16 99.99 999 9999999 999	145	90 A 2	0.980 S 0.047	1.432 999	0.546 999	1.902 999
26	WET	0 999 999 0.16 99.99 999 408 S 29.8	145	90 A 2	0.921 S 0.022	1.696 999	0.546 999	1.902 999
27	MOIST	0 999 999 0.16 99.99 999 382 S 10.5	145	30 A 4	0.921 S 0.016	1.441 999	0.142 999	1.398 999
28	DRY	0 999 999 0.16 99.99 999 9999999 999	145	99 999	99 999 999	99999.999 999 99999.999 999	9999.999 999	9999.999 999

Record#	MTOTASTDEV	LAISTDEV	FLW	ELSTDEV	CHNL	FLOSTDEV
	LAI	FLL	FLWSTDEV	EL	DIEARFLAF	FLO
					DIEFLSTDEV	CHNLSTDEV
1	999	9999.999	999	99.999	999	9999.999
2	999	9999.999	999	99.999	999	9999.999
3	999	4.535	999	0.014	999	9999.999
4	999	5.372	999	0.014	999	9999.999
5	999	3.646	999	0.094	999	9999.999
6	999	4.183	999	0.122	999	9999.999
7	999	9999.999	999	99.999	999	9999.999
8	999	0.829	999	99.999	999	9999.999
9	999	2.246	999	99.999	999	9999.999
10	999	4.414	999	0.144	999	9999.999
11	999	3.792	999	0.152	999	9999.999
12	999	2.618	999	0.173	999	9999.999
13	999	1.392	999	0.167	999	9999.999
14	999	9999.999	999	99.999	999	9999.999
15	999	1.631	999	99.999	999	9999.999
16	999	3.145	999	99.999	999	9999.999
17	999	4.343	999	0.173	999	9999.999
18	999	4.117	999	0.149	999	9999.999
19	999	1.867	999	0.165	999	9999.999
20	999	0.676	999	0.146	999	9999.999
21	999	9999.999	999	99.999	999	9999.999
22	999	1.638	999	99.999	999	9999.999
23	999	2.953	999	99.999	999	9999.999
24	999	3.800	999	0.155	999	9999.999
25	999	3.053	999	0.174	999	9999.999
26	999	1.041	999	0.151	999	9999.999
27	999	9999.999	999	0.136	999	9999.999
28	999	9999.999	999	99.999	999	9999.999

Record#	SRPTC	SRPTCSTDEV	SRPLT	SRPLTSTDEV	VM1	VM1STDEV	VM2	VM2STDEV	VM3	VM3STDEV	VM4	VM4STDEV	VMCOMMENT							
1	2.76	R	1.557-4.939	1.83	R	0.812-4.379	999.99	999.99	999.99	999.99	999.99	28.10	S	2.9 SA: 0-5 CM UNDER TOPLAYER						
2	0.79	R	0.586-0.928	0.58	R	0.486-0.740	15.80	S	2.6	13.30	S	1.2	22.00	S	4.5	18.00	S	2.3	3	SEGMENTS UNDER TOPLAYER
3	0.52	R	0.321-0.778	0.50	R	0.433-0.558	20.10	S	2.0	25.10	S	2.0	30.50	S	2.5	26.80	S	1.7	3	SEGMENTS UNDER TOPLAYER
4	0.52	R	0.321-0.778	0.50	R	0.433-0.558	999.99	999.99	999.99	999.99	999.99	39.30	S	1.7	SAMPLE: 0-5 CM DEPTH					
5	0.52	R	0.321-0.778	0.50	R	0.433-0.558	999.99	999.99	999.99	999.99	40.00	S	1.5	SAMPLE: 0-5 CM DEPTH						
6	0.52	R	0.321-0.778	0.50	R	0.433-0.558	999.99	999.99	999.99	999.99	41.40	S	1.2	SAMPLE: 0-5 CM DEPTH						
7	0.52	R	0.321-0.778	0.50	R	0.433-0.558	999.99	999.99	999.99	999.99	27.90	S	2.9	SAMPLE: 0-5 CM DEPTH						
8	0.76	R	0.523-0.889	0.67	R	0.397-1.174	999.99	999.99	999.99	999.99	32.70	S	2.2	SA: 0-5 CM UNDER TOPLAYER						
9	0.76	R	0.523-0.889	0.67	R	0.397-1.174	28.40	S	3.8	27.40	S	1.6	27.90	S	3.6	27.80	S	1.9	SAMPLED IN 3 SEGMENTS	
10	0.76	R	0.523-0.889	0.67	R	0.397-1.174	19.90	S	3.1	24.30	S	1.8	24.40	S	1.8	23.50	S	1.3	3	SEGMENTS UNDER TOPLAYER
11	0.76	R	0.523-0.889	0.67	R	0.397-1.174	999.99	999.99	999.99	999.99	40.30	S	2.2	SAMPLE: 0-5 CM DEPTH						
12	0.76	R	0.523-0.889	0.67	R	0.397-1.174	999.99	999.99	999.99	999.99	42.20	S	3.8	SAMPLE: 0-5 CM DEPTH						
13	1.39	R	1.122-1.656	0.47	R	0.300-0.632	999.99	999.99	999.99	999.99	41.70	S	2.9	SAMPLE: 0-5 CM DEPTH						
14	1.39	R	1.122-1.656	0.47	R	0.300-0.632	999.99	999.99	999.99	999.99	28.00	S	4.1	SA: 0-5 CM UNDER TOPLAYER						
15	1.15	R	0.828-1.510	0.62	R	0.556-0.686	999.99	999.99	999.99	999.99	32.90	S	2.0	SA: 0-5 CM UNDER TOPLAYER						
16	1.15	R	0.828-1.510	0.62	R	0.556-0.686	29.70	S	3.9	29.90	S	2.5	31.10	S	3.8	30.40	S	2.9	SAMPLED IN 3 SEGMENTS	
17	1.15	R	0.828-1.510	0.62	R	0.556-0.686	17.60	S	3.3	23.80	S	1.4	26.90	S	1.3	24.10	S	1.2	3	SEGMENTS UNDER TOPLAYER
18	1.15	R	0.828-1.510	0.62	R	0.556-0.686	999.99	999.99	999.99	999.99	40.30	S	2.6	SAMPLE: 0-5 CM DEPTH						
19	1.15	R	0.828-1.510	0.62	R	0.556-0.686	999.99	999.99	999.99	999.99	38.10	S	1.9	SAMPLE: 0-5 CM DEPTH						
20	1.15	R	0.828-1.510	0.62	R	0.556-0.686	999.99	999.99	999.99	999.99	42.90	S	1.9	SAMPLE: 0-5 CM DEPTH						
21	1.15	R	0.828-1.510	0.62	R	0.556-0.686	999.99	999.99	999.99	999.99	31.10	S	3.2	SAMPLE: 0-5 CM DEPTH						
22	0.95	R	0.828-1.039	0.56	R	0.538-0.572	999.99	999.99	999.99	999.99	33.90	S	2.1	SAMPLE: 0-5 CM DEPTH						
23	0.95	R	0.828-1.039	0.56	R	0.538-0.572	32.30	S	5.2	32.50	S	2.6	36.70	S	3.8	34.60	S	2.6	SAMPLED IN 3 SEGMENTS	
24	0.95	R	0.828-1.039	0.56	R	0.538-0.572	16.90	S	2.6	25.00	S	2.2	30.30	S	1.8	26.00	S	1.3	3	SEGMENTS UNDER TOPLAYER
25	0.95	R	0.828-1.039	0.56	R	0.538-0.572	999.99	999.99	999.99	999.99	42.80	S	1.6	SAMPLE: 0-5 CM DEPTH						
26	0.95	R	0.828-1.039	0.56	R	0.538-0.572	999.99	999.99	999.99	999.99	40.70	S	2.6	SAMPLE: 0-5 CM DEPTH						
27	0.95	R	0.828-1.039	0.56	R	0.538-0.572	999.99	999.99	999.99	999.99	45.80	S	0.9	SAMPLE: 0-5 CM DEPTH						
28	0.95	R	0.828-1.039	0.56	R	0.538-0.572	999.99	999.99	999.99	999.99	37.40	S	2.6	SA: 0-5 CM UNDER TOPLAYER						

Record#	SSTH	SSTHSTDEV	CM1	CM2	CM3	CM3STDEV	CM4STDEV	CMCOMMENT
1	8.90 S 0.6	0.005 R 0.005-0.006	999.99 999	999.99 999	999.99 999	30.60 S 1.6	DRY TOP-LAYER SAMPLED	
2	14.80 S 2.5	0.012 R 0.010-0.014	17.50 S 3.1	14.10 S 1.3	20.90 S 4.0	18.20 S 1.9	DRY TOP-LAYER SAMPLED	
3	10.50 S 1.6	0.005 R 0.004-0.007	19.40 S 1.8	24.30 S 1.2	28.70 S 1.8	25.50 S 1.4	DRY TOP-LAYER SAMPLED	
4	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	39.50 S 2.1	NO DRY TOP-LAYER SAMPLED	
5	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	37.40 S 1.3	NO DRY TOP-LAYER SAMPLED	
6	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	38.40 S 1.4	NO DRY TOP-LAYER SAMPLED	
7	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	25.90 S 2.1	NO DRY TOP-LAYER SAMPLED	
8	11.80 S 1.3	0.003 R 0.002-0.005	999.99 999	999.99 999	999.99 999	31.00 S 1.1	DRY TOP-LAYER SAMPLED	
9	999.99 999	99.999 999	25.30 S 2.2	25.50 S 1.2	26.10 S 1.0	25.80 S 0.8	NO DRY TOP-LAYER SAMPLED	
10	7.40 S 1.7	0.004 R 0.003-0.005	16.90 S 2.2	21.30 S 1.0	22.70 S 0.8	21.10 S 0.9	DRY TOP-LAYER SAMPLED	
11	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	36.90 S 0.8	NO DRY TOP-LAYER SAMPLED	
12	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	36.40 S 1.9	NO DRY TOP-LAYER SAMPLED	
13	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	37.40 S 1.4	NO DRY TOP-LAYER SAMPLED	
14	12.40 S 3.4	0.002 R 0.002-0.003	999.99 999	999.99 999	999.99 999	23.90 S 3.5	DRY TOP-LAYER SAMPLED	
15	8.60 S 1.8	0.001 R 0.001-0.002	999.99 999	999.99 999	999.99 999	30.50 S 1.8	DRY TOP-LAYER SAMPLED	
16	999.99 999	99.999 999	25.10 S 2.4	26.90 S 1.8	27.80 S 2.1	27.00 S 1.9	NO DRY TOP-LAYER SAMPLED	
17	9.00 S 1.2	0.005 R 0.002-0.010	16.30 S 2.0	21.20 S 1.6	23.10 S 2.1	21.10 S 1.8	DRY TOP-LAYER SAMPLED	
18	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	36.50 S 1.7	NO DRY TOP-LAYER SAMPLED	
19	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	34.00 S 1.1	NO DRY TOP-LAYER SAMPLED	
20	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	37.10 S 2.6	NO DRY TOP-LAYER SAMPLED	
21	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	28.00 S 1.7	NO DRY TOP-LAYER SAMPLED	
22	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	32.10 S 2.0	NO DRY TOP-LAYER SAMPLED	
23	999.99 999	99.999 999	29.90 S 1.9	30.80 S 1.4	31.00 S 1.6	30.80 S 1.5	NO DRY TOP-LAYER SAMPLED	
24	10.20 S 2.0	0.005 R 0.003-0.010	17.50 S 1.6	22.60 S 1.1	24.60 S 1.2	22.60 S 0.9	DRY TOP-LAYER SAMPLED	
25	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	34.90 S 1.6	NO DRY TOP-LAYER SAMPLED	
26	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	34.90 S 1.4	NO DRY TOP-LAYER SAMPLED	
27	999.99 999	99.999 999	999.99 999	999.99 999	999.99 999	37.20 S 1.9	NO DRY TOP-LAYER SAMPLED	
28	8.00 S 2.3	0.008 R 0.003-0.012	999.99 999	999.99 999	999.99 999	29.90 S 1.9	DRY TOP-LAYER SAMPLED	

Record#	FIELDREF	SPECIES	VARIETY	PHENOCOMME	YIELD	ABNORMALTI
				SOWDATE	HARVDATE	
1	FLO362.SBT.880422	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 BARE SOIL
2	FLO362.SBT.880502	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 999
3	FLO362.SBT.880614	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 999
4	FLO362.SBT.880705	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 999
5	FLO362.SBT.880714	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 999
6	FLO362.SBT.880726	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 LICE IN CROP
7	FLO362.SBT.880816	SUGAR BEETS	REGINA	999 999 880418	881012	0.6340 999
8	FLO512.SBT.880422	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 BARE SOIL
9	FLO512.SBT.880502	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 999
10	FLO512.SBT.880614	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 999
11	FLO512.SBT.880705	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 999
12	FLO512.SBT.880714	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 999
13	FLO512.SBT.880726	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 YELLOW SPOTS IN FIELD
14	FLO512.SBT.880816	SUGAR BEETS	ACCORD	999 999 880412	881001	0.6800 YELLOW SPOTS IN FIELD 8 M
15	FLO722.SBT.880422	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 BARE SOIL
16	FLO722.SBT.880502	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 2% POTATO-SHOOTS
17	FLO722.SBT.880614	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 SOME POTATOE-SHOOTS
18	FLO722.SBT.880705	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 IRREGULAR CROP
19	FLO722.SBT.880714	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 IRREGULAR GROWTH
20	FLO722.SBT.880726	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 IRREGULAR GROWTH
21	FLO722.SBT.880816	SUGAR BEETS	UNIVERS	999 999 880415	881026	0.7300 YELLOW SPOTS IN FIELD 10M

Record#	CROPCONDI	WEEDCOVER	ROWSPAC	PLANTSPAC	PLANTDENS	CROPCOVER	CRHEISTDEV
		WCOVSTDEV	WCOVCOM	FLSPSTDEV	FLDENSTDEV	ROWDIR	CROPHEIGHT
1	999	0 999 999	99 99 999	999 999 999	145 0 999	99 999 999	9999.999
2	999	DRY 0 999 999	0.50 99.99 999	6.10 999 145	1 A 1	0.005 999	0.015
3	999	DRY 0 999 999	0.50 99.99 999	9.30 999 145	25 A 4	0.142 S 0.043	0.265
4	999	WET 0 999 999	0.50 99.99 999	9.30 999 145	75 A 5	0.465 S 0.062	0.500
5	999	WET 0 999 999	0.50 99.99 999	9.30 999 145	85 A 3	0.514 S 0.068	9999.999
6	999	MOIST 0 999 999	0.50 99.99 999	9.30 999 145	80 A 3	0.594 S 0.076	9999.999
7	999	DRY 0 999 999	0.50 99.99 999	9.30 999 145	96 A 1	0.654 S 0.072	9999.999
8	999	DRY 0 999 999	99 99 999	999 999 145	0 999	99 999 999	9999.999
9	2 SEED-LEAVES	DRY 1 999 999	0.50 99.99 999	9.10 999 145	0 999	0.010 S 0.008	0.020
10	999	DRY 0 999 999	0.50 99.99 999	8.20 999 145	55 A 5	0.234 S 0.064	0.374
11	999	WET 0 999 999	0.50 99.99 999	8.20 999 145	88 A 3	0.479 S 0.070	0.460
12	999	WET 0 999 999	0.50 99.99 999	8.20 999 145	90 A 2	0.557 S 0.043	0.440
13	999	MOIST 0 999 999	0.50 99.99 999	8.20 999 145	85 A 3	0.591 S 0.059	9999.999
14	999	DRY 0 999 999	0.50 99.99 999	8.20 999 145	98 A 1	0.625 S 0.071	9999.999
15	999	DRY 0 999 999	0.50 99.99 999	999 999 145	0 999	99 999 999	9999.999
16	999	DRY 2 999 999	0.50 99.99 999	8.00 999 145	0 999	0.010 999	0.020
17	999	DRY 2 999 999	0.50 99.99 999	9.30 999 145	30 A 4	0.216 S 0.064	0.295
18	999	WET 0 999 999	0.50 99.99 999	9.30 999 145	70 A 5	0.399 S 0.059	0.450
19	999	WET 0 999 999	0.50 99.99 999	9.30 999 145	75 A 5	0.482 S 0.060	0.478
20	999	MOIST 0 999 999	0.50 99.99 999	9.30 999 145	87 A 3	0.508 S 0.066	9999.999
21	999	DRY 0 999 999	0.50 99.99 999	9.30 999 145	96 A 1	0.553 S 0.051	9999.999

Record#	PLDISSTDEV	FLEAVSTDEV	PFWTUBER	FTUBERSTDE	FTOTASTDEV	PDMLEAVES	PDMSTEMS
1	999	9999.999	999	9999.999	999	9999.999	999
2	999	9999.999	999	9999.999	999	9999.999	999
3	S 0.053	0.332	999	0.192	999	0.000	999
4	S 0.081	1.311	999	0.892	999	0.524	S 0.1524
5	999	2.106	999	3.079	999	2.745	S 0.6824
6	999	2.109	999	4.175	999	5.185	S 0.8992
7	999	1.966	999	5.141	999	6.284	S 0.9364
8	999	9999.999	999	9999.999	999	7.107	S 1.1751
9	999	9999.999	999	9999.999	999	9999.999	999
10	S 0.070	0.523	999	0.411	999	0.001	999
11	S 0.070	1.433	999	1.879	999	0.934	S 0.3696
12	S 0.065	1.532	999	3.244	999	3.312	S 0.4816
13	999	1.760	999	3.587	999	4.776	S 0.2532
14	999	1.747	999	4.332	999	5.348	S 0.7005
15	999	9999.999	999	9999.999	999	6.079	S 0.4937
16	999	9999.999	999	9999.999	999	9999.999	999
17	S 0.068	0.339	999	0.271	999	0.000	999
18	S 0.091	1.164	999	1.080	999	0.610	S 0.2570
19	S 0.064	1.372	999	2.068	999	2.243	S 0.7828
20	999	1.884	999	3.064	999	3.440	S 0.5862
21	999	1.911	999	3.769	999	4.948	S 0.1599
						5.680	S 0.3210
						0.211	999
						0.400	999
						0.032	999
						0.140	999
						0.257	999
						0.264	999
						0.400	999
						0.022	999
						0.075	999
						0.173	999
						0.235	999
						0.313	999

Record#	DSTEMSTDEV	DTUBERSTDE	PDMLEAVES	MLEAVSTDEV	PDMSTEMS	MSTEMSTDEV	PDMCTUBER	PDMCTOTAL	MTOTASTDEV	LAI	LAISTDEV
1	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
2	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
3	999	9999.999	999	0.051	999	91.667	999	9999.999	999	90.267	999
4	999	0.124	999	0.205	999	91.533	999	93.375	999	86.099	999
5	999	0.228	999	0.366	999	92.355	999	93.310	999	87.561	999
6	999	0.391	999	0.473	999	90.469	999	93.485	999	84.774	999
7	999	1.090	999	0.670	999	89.013	999	91.169	999	80.399	999
8	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
9	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
10	999	9999.999	999	0.087	999	89.484	999	92.214	999	90.685	999
11	999	0.192	999	0.276	999	90.509	999	92.549	999	84.615	999
12	999	0.301	999	0.392	999	91.188	999	92.078	999	84.752	999
13	999	0.453	999	0.461	999	88.750	999	92.640	999	82.690	999
14	999	0.811	999	0.597	999	88.724	999	90.766	999	80.176	999
15	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
16	999	9999.999	999	0.000	999	9999.999	999	9999.999	999	9999.999	999
17	999	9999.999	999	0.061	999	88.496	999	91.882	999	84.817	999
18	999	0.162	999	0.189	999	90.206	999	93.056	999	85.995	999
19	999	0.271	999	0.296	999	91.035	999	91.634	999	85.995	999
20	999	0.567	999	0.425	999	89.968	999	92.298	999	83.210	999
21	999	1.091	999	0.524	999	88.959	999	91.695	999	79.298	999
						90.775	999	90.775	999	4.810	999

Record#	LL	LW	LWSTDEV	NLPP	NLPSTDEV	UCL11	UCL12	UCL2STDEV	MCL11	MCL12	MCL1STDEV
1	99.999 999	99.999 999	9999.999 999	9999.999 999	999 999 999	999 999 999	999 999 999	999 999 999	999 999	999 999	999 999
2	0.007 999	0.002 999	2.000 999	999 999	999 999	999 999	999 999	HORIZONTAL	999 999	999 999	999 999
3	99.999 999	99.999 999	6.500 S 1.1	999 999	999 999	999 999	999 999	HORIZONTAL	999 999	999 999	999 999
4	0.280 S 0.022	0.210 S 0.009	10.500 S 1.2	38 R 30-45	999 999	999 999	999 999	SLANT UP	999 999	999 999	999 999
5	0.295 S 0.031	0.224 S 0.021	13.200 S 0.8	23 R 0-45	999 999	999 999	999 999	ERECT	999 999	999 999	999 999
6	0.366 S 0.033	0.211 S 0.025	19.900 S 1.9	20 R 0-40	999 999	999 999	999 999	999 999	999 999	999 999	999 999
7	0.353 S 0.040	0.226 S 0.025	20.300 S 3.3	10 R 0-20	999 999	999 999	999 999	STEEP INCLINATION	999 999	999 999	999 999
8	99.999 999	99.999 999	9999.999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999
9	0.010 999	0.003 999	2.000 999	75 R 60-90	999 999	999 999	999 999	HORIZONTAL	999 999	999 999	999 999
10	99.999 999	99.999 999	9.100 S 1.9	45 R 0-90	999 999	999 999	999 999	999 999	999 999	999 999	999 999
11	0.290 S 0.018	0.200 S 0.027	16.200 S 1.3	15 R 0-30	999 999	999 999	999 999	999 999	999 999	999 999	999 999
12	0.280 S 0.029	0.208 S 0.023	20.200 S 2.9	23 R 0-45	999 999	999 999	999 999	999 999	999 999	999 999	999 999
13	0.311 S 0.029	0.234 S 0.018	19.100 S 3.6	23 R 0-45	999 999	999 999	999 999	999 999	999 999	999 999	999 999
14	0.333 S 0.010	0.212 S 0.023	23.700 S 4.6	10 R 0-20	999 999	999 999	999 999	999 999	999 999	999 999	999 999
15	99.999 999	99.999 999	9999.999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999
16	0.010 999	0.003 999	2.000 999	999 999	999 999	999 999	999 999	HORIZONTAL	999 999	999 999	999 999
17	99.999 999	99.999 999	9.800 S 1.3	45 R 0-90	999 999	999 999	999 999	999 999	999 999	999 999	999 999
18	0.258 S 0.025	0.196 S 0.021	13.900 S 1.7	15 R 0-30	999 999	999 999	999 999	999 999	999 999	999 999	999 999
19	0.238 S 0.030	0.188 S 0.024	17.200 S 1.3	23 R 0-45	999 999	999 999	999 999	999 999	999 999	999 999	999 999
20	0.290 S 0.050	0.214 S 0.011	22.400 S 5.0	20 R 0-40	999 999	999 999	999 999	999 999	999 999	999 999	999 999
21	0.302 S 0.021	0.212 S 0.016	26.400 S 4.5	10 R 0-20	999 999	999 999	999 999	999 999	999 999	999 999	999 999

Record#	MCL12	LCL11	LCL2STDEV	SRFTC	SRPLT	SRPLTSTDEV	VM1	VM2	VM1STDEV	VM2STDEV
1	999 999 999	999 999 999	999 999 999	0.68 R	0.498-0.830	0.51 R	0.242-0.830	999.99 999	999.99 999	999.99 999
2	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	20.50 S 1.9	26.60 S 4.9	999.99 999
3	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	13.90 S 3.6	27.70 S 3.3	999.99 999
4	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	999.99 999	999.99 999	999.99 999
5	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	999.99 999	999.99 999	999.99 999
6	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	999.99 999	999.99 999	999.99 999
7	999 999 999	999 999 999	999 999 999	0.69 R	0.559-0.886	0.47 R	0.369-0.569	999.99 999	999.99 999	999.99 999
8	999 999 999	999 999 999	999 999 999	0.54 R	0.419-0.751	0.32 R	0.270-0.361	999.99 999	999.99 999	999.99 999
9	999 999 999	999 999 999	999 999 999	0.92 R	0.582-1.175	0.47 R	0.443-0.499	22.20 S 2.4	26.10 S 2.0	999.99 999
10	999 999 999	999 999 999	999 999 999	0.84 R	0.781-0.898	0.56 999	22.60 S 3.5	31.80 S 1.2	999.99 999	999.99 999
11	999 999 999	999 999 999	999 999 999	0.84 R	0.781-0.898	0.56 999	999.99 999	999.99 999	999.99 999	999.99 999
12	999 999 999	999 999 999	999 999 999	0.84 R	0.781-0.898	0.56 999	999.99 999	999.99 999	999.99 999	999.99 999
13	999 999 999	999 999 999	999 999 999	1.47 R	1.432-1.502	0.56 R	0.558-0.566	999.99 999	999.99 999	999.99 999
14	999 999 999	999 999 999	999 999 999	1.47 R	1.432-1.502	0.56 R	0.558-0.566	999.99 999	999.99 999	999.99 999
15	999 999 999	999 999 999	999 999 999	0.84 R	0.660-1.010	0.39 R	0.362-0.422	999.99 999	999.99 999	999.99 999
16	999 999 999	999 999 999	999 999 999	0.87 R	0.649-1.367	0.53 R	0.451-0.617	16.70 S 2.3	22.60 S 3.9	999.99 999
17	999 999 999	999 999 999	999 999 999	1.34 R	1.073-1.820	0.67 R	0.586-0.754	17.70 S 3.1	30.20 S 4.6	999.99 999
18	999 999 999	999 999 999	999 999 999	1.34 R	1.073-1.820	0.67 R	0.586-0.754	999.99 999	999.99 999	999.99 999
19	999 999 999	999 999 999	999 999 999	1.34 R	1.073-1.820	0.67 R	0.586-0.754	999.99 999	999.99 999	999.99 999
20	999 999 999	999 999 999	999 999 999	1.34 R	1.073-1.820	0.67 R	0.586-0.754	999.99 999	999.99 999	999.99 999
21	999 999 999	999 999 999	999 999 999	1.34 R	1.073-1.820	0.67 R	0.586-0.754	999.99 999	999.99 999	999.99 999

Record#	VM3	VM4	VM4STDEV	VNCOMMENT	GMS	GMSSTDEV	SSTH	SSTHSTDEV
1	999.99 999	31.00 S 2.4 SA: 0-5 CM	UNDER TOPLAYER	10.70 S 1.5	0.005 R	0.004-0.007		
2	36.70 S 4.7	30.40 S 3.9 3 SEGMENTS	UNDER TOPLAYER	8.60 S 1.4	0.002 R	0.001-0.003		
3	34.50 S 3.6	28.30 S 2.9 3 SEGMENTS	UNDER TOPLAYER	4.40 S 0.5	0.013 R	0.010-0.014		
4	999.99 999	44.70 S 3.7 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
5	999.99 999	39.40 S 2.3 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
6	999.99 999	38.10 S 3.3 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
7	999.99 999	24.50 S 4.9 SA: 0-5 CM	UNDER TOPLAYER	7.70 S 1.7	0.006 R	0.002-0.013		
8	999.99 999	28.50 S 3.6 SA: 0-5 CM	UNDER TOPLAYER	7.20 S 0.7	0.003 R	0.002-0.004		
9	32.20 S 3.5	28.40 S 2.5 SAMPLED IN 3	SEGMENTS	999.99 999	99.999 999			
10	38.70 S 2.9	33.40 S 1.9 3 SEGMENTS	UNDER TOPLAYER	3.90 S 0.7	0.021 R	0.010-0.030		
11	999.99 999	44.90 S 5.1 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
12	999.99 999	37.10 S 3.3 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
13	999.99 999	43.30 S 2.0 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
14	999.99 999	23.10 S 4.0 SA: 0-5 CM	UNDER TOPLAYER	8.60 S 1.1	0.010 R	0.004-0.020		
15	999.99 999	29.20 S 2.3 SA: 0-5 CM	UNDER TOPLAYER	8.00 S 0.8	0.006 R	0.005-0.008		
16	31.50 S 4.4	26.00 S 3.1 3 SEGMENTS	UNDER TOPLAYER	12.00 S 1.4	0.002 R	0.001-0.003		
17	37.80 S 2.5	31.50 S 2.7 3 SEGMENTS	UNDER TOPLAYER	6.40 S 2.3	0.025 R	0.020-0.030		
18	999.99 999	41.30 S 2.6 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
19	999.99 999	39.70 S 3.7 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
20	999.99 999	47.40 S 2.9 SAMPLE: 0-5 CM	DEPTH	999.99 999	99.999 999			
21	999.99 999	28.50 S 4.5 SA: 0-5 CM	UNDER TOPLAYER	9.80 S 2.5	0.012 R	0.005-0.030		

Record#	GM1	GM2	GM2STDEV	GM3	GM3STDEV	GM4	GMCOMMENT
1	999.99 999	999.99 999	999.99 999	999.99 999	31.30 S 2.2	DRY TOP-LAYER SAMPLED	
2	22.20 S 1.6	26.80 S 3.5	31.30 S 2.4	28.10 S 2.4	DRY TOP-LAYER SAMPLED		
3	13.60 S 4.2	25.70 S 2.3	31.00 S 1.8	25.90 S 2.1	DRY TOP-LAYER SAMPLED		
4	999.99 999	999.99 999	999.99 999	36.60 S 1.0	NO DRY TOP-LAYER SAMPLED		
5	999.99 999	999.99 999	999.99 999	35.10 S 1.1	NO DRY TOP-LAYER SAMPLED		
6	999.99 999	999.99 999	999.99 999	35.60 S 0.9	NO DRY TOP-LAYER SAMPLED		
7	999.99 999	999.99 999	999.99 999	20.10 S 2.3	DRY TOP-LAYER SAMPLED		
8	999.99 999	999.99 999	999.99 999	27.60 S 2.4	DRY TOP-LAYER SAMPLED		
9	22.20 S 1.4	25.70 S 1.9	28.30 S 1.9	26.30 S 1.7	NO DRY TOP-LAYER SAMPLED		
10	21.30 S 3.3	27.10 S 1.3	29.60 S 1.5	27.20 S 1.6	DRY TOP-LAYER SAMPLED		
11	999.99 999	999.99 999	999.99 999	39.50 S 2.8	NO DRY TOP-LAYER SAMPLED		
12	999.99 999	999.99 999	999.99 999	34.10 S 1.4	NO DRY TOP-LAYER SAMPLED		
13	999.99 999	999.99 999	999.99 999	38.60 S 1.2	NO DRY TOP-LAYER SAMPLED		
14	999.99 999	999.99 999	999.99 999	20.80 S 1.7	DRY TOP-LAYER SAMPLED		
15	999.99 999	999.99 999	999.99 999	31.60 S 2.4	DRY TOP-LAYER SAMPLED		
16	22.40 S 2.1	26.20 S 3.5	32.60 S 2.5	28.00 S 3.3	DRY TOP-LAYER SAMPLED		
17	21.70 S 3.6	30.10 S 1.9	33.60 S 1.5	30.20 S 1.9	DRY TOP-LAYER SAMPLED		
18	999.99 999	999.99 999	999.99 999	41.30 S 2.6	NO DRY TOP-LAYER SAMPLED		
19	999.99 999	999.99 999	999.99 999	38.60 S 1.8	NO DRY TOP-LAYER SAMPLED		
20	999.99 999	999.99 999	999.99 999	40.60 S 2.0	NO DRY TOP-LAYER SAMPLED		
21	999.99 999	999.99 999	999.99 999	25.60 S 2.1	DRY TOP-LAYER SAMPLED		

Record#	FIELDREF	SPECIES	VARIETY	PHENOCOMME	HARVDATE	YIELD	ABNORMALTY
				MANPRAC	SOWDATE		
1	FLO320.POT.880422	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	RIDGES NOT MOULDED UP
2	FLO320.POT.880502	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	RIDGES MOULDED UP
3	FLO320.POT.880614	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	999
4	FLO320.POT.880705	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	999
5	FLO320.POT.880714	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	SOME NEED SHOOT
6	FLO320.POT.880726	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	SOME NEED SHOOT
7	FLO320.POT.880816	POTATOES	BINTJE	999 999 RIDGES	880415 880921	0.6400	SOME NEED SHOOT
8	FLO520.POT.880422	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	RIDGES NOT MOULDED UP
9	FLO520.POT.880502	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	RIDGES MOULDED UP
10	FLO520.POT.880614	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	999
11	FLO520.POT.880705	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	999
12	FLO520.POT.880714	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	999
13	FLO520.POT.880726	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	999
14	FLO520.POT.880816	POTATOES	BINTJE	999 999 RIDGES	880415 880922	0.6500	CROP SOMEWHAT COLLAPSED
15	FLO710.POT.880422	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	RIDGES NOT MOULDED UP
16	FLO710.POT.880502	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	RIDGES MOULDED UP
17	FLO710.POT.880614	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	CROP SPRAYED
18	FLO710.POT.880705	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	999
19	FLO710.POT.880714	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	999
20	FLO710.POT.880726	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	IRREGULAR CROPHHEIGHT
21	FLO710.POT.880816	POTATOES	BINTJE	999 999 RIDGES	880418 881003	0.6000	CROP SOMEWHAT COLLAPSED

Record#	CROPCONDIT	WEEDCOVER	ROWSPAC	PLANTSPAC	PLANTDENS	CROPCOVER	CROPHHEIGHT
		WCOVSTDEV		PLSPSTDEV	PLDENSTDEV	ROWDIR	
1	CROP NOT EMERGED DRY	1 999	99.99	99.99	999.99	145	0 999 99.999 999
2	CROP NOT EMERGED DRY	0 999	99.99	99.99	999.99	145	0 999 99.999 999
3	HEALTHY CROP DRY	0 999	99.99	99.99	999.99	145	0 999 99.999 999
4	START FLOWERING WET	0 999	99.99	99.99	999.99	145	40 A 5 0.346 S 0.055
5	FRESH GREEN CROP WET	0 999	99.99	99.99	999.99	145	86 A 3 0.614 S 0.033
6	LEAVE YELLOWING MOIST	0 999	99.99	99.99	999.99	145	92 A 2 0.638 S 0.059
7	UNDULATING CROP DRY	0 999	99.99	99.99	999.99	145	98 A 1 0.539 S 0.097
8	CROP NOT EMERGED DRY	7 999	99.99	99.99	999.99	145	0 999 99.999 999
9	CROP NOT EMERGED DRY	0 999	99.99	99.99	999.99	145	0 999 99.999 999
10	HEALTHY CROP DRY	0 999	99.99	99.99	999.99	145	45 A 5 0.391 S 0.046
11	START FLOWERING WET	0 999	99.99	99.99	999.99	145	90 A 2 0.600 S 0.047
12	HEALTHY CROP WET	0 999	99.99	99.99	999.99	145	95 A 1 0.640 S 0.033
13	STRAIGHT UP CROP MOIST	0 999	99.99	99.99	999.99	145	90 A 2 0.610 S 0.076
14	UNDULATING CROP DRY	0 999	99.99	99.99	999.99	145	97 A 1 0.537 S 0.091
15	CROP NOT EMERGED DRY	0 999	99.99	99.99	999.99	145	0 999 99.999 999
16	CROP NOT EMERGED W. RIDGE MOIST	0 999	99.99	99.99	999.99	145	0 999 99.999 999
17	999	0 999	99.99	99.99	999.99	145	50 A 5 0.445 S 0.038
18	HEALTHY CROP WET	0 999	99.99	99.99	999.99	145	89 A 3 0.640 S 0.036
19	FRESH CROP WET	0 999	99.99	99.99	999.99	145	93 A 2 0.691 S 0.048
20	999	0 999	99.99	99.99	999.99	145	85 A 3 0.629 S 0.118
21	999	0 999	99.99	99.99	999.99	145	95 A 1 0.468 S 0.119

Record#	PLDI	PFLEAVES	FLEAVSTDEV	PFWSTMS	FSTEMSTDEV	PFWTOTAL	FTOTASTDEV	FMLEAVES	DLEAVSTDEV	PFMSTMS	DSTEMSTDEV	PDWTOTAL	DTOTASTDEV	
1	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	
2	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	9999.999	
3	0.412	S 0.064	0.336	999	0.268	999	0.604	S 0.1174	0.040	999	0.016	999	0.037	999
4	0.700	S 0.049	0.834	999	0.538	999	1.392	S 0.1783	0.081	999	0.044	999	0.125	999
5	0.758	S 0.054	1.258	999	1.108	999	2.365	S 0.3010	0.120	999	0.090	999	0.210	999
6	9999.999	999	1.317	999	1.525	999	2.843	S 0.2352	0.145	999	0.144	999	0.289	999
7	9999.999	999	1.477	999	1.539	999	3.016	S 0.3543	0.180	999	0.180	999	0.360	999
8	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
9	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
10	0.520	S 0.061	0.396	999	0.379	999	0.775	S 0.1406	0.044	999	0.022	999	0.066	999
11	0.720	S 0.057	0.924	999	0.624	999	1.548	S 0.1460	0.097	999	0.057	999	0.153	999
12	0.763	S 0.059	1.331	999	1.028	999	2.360	S 0.2390	0.145	999	0.096	999	0.240	999
13	9999.999	999	1.248	999	1.491	999	2.738	S 0.4461	0.130	999	0.139	999	0.269	999
14	9999.999	999	1.377	999	1.406	999	2.783	S 0.4196	0.172	999	0.170	999	0.342	999
15	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
16	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999
17	0.495	S 0.049	0.560	999	0.630	999	1.190	S 0.0958	0.062	999	0.037	999	0.099	999
18	0.752	S 0.101	0.953	999	0.861	999	1.814	S 0.2848	0.096	999	0.069	999	0.165	999
19	9999.999	999	1.089	999	1.147	999	2.236	S 0.2623	0.113	999	0.097	999	0.210	999
20	9999.999	999	1.202	999	1.460	999	2.662	S 0.1845	0.134	999	0.135	999	0.269	999
21	9999.999	999	1.256	999	1.708	999	2.964	S 0.3438	0.134	999	0.165	999	0.299	999

Record#	PMLEAVES	PMSTMS	MSTEMSTDEV	PMCTOTAL	MTOTASTDEV	LL	LLSTDEV	LWSTDEV	NLPP	NSPP	NSPSTDEV
1	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
2	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
3	88.095	999	94.030	999	90.563	999	0.764	999	999	999	999
4	90.288	999	92.115	999	91.020	999	2.211	999	999	999	999
5	90.461	999	91.877	999	91.121	999	3.237	999	999	999	999
6	89.066	999	90.492	999	89.835	999	3.805	999	999	999	999
7	87.813	999	88.304	999	88.064	999	4.802	999	999	999	999
8	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
9	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
10	88.889	999	94.195	999	91.484	999	0.940	999	999	999	999
11	89.502	999	90.865	999	90.116	999	2.639	999	999	999	999
12	89.106	999	90.661	999	89.831	999	3.596	999	999	999	999
13	89.583	999	90.677	999	90.175	999	3.361	999	999	999	999
14	87.509	999	87.909	999	87.711	999	4.382	999	999	999	999
15	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
16	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999	999	9999.999
17	88.929	999	94.127	999	91.681	999	1.480	999	999	999	999
18	89.927	999	91.986	999	90.904	999	2.643	999	999	999	999
19	89.624	999	91.543	999	90.608	999	3.106	999	999	999	999
20	88.852	999	90.753	999	89.895	999	3.338	999	999	999	999
21	89.331	999	90.340	999	89.912	999	4.190	999	999	999	999

Record#	UCL11	UCL12	UCL2STDEV	UCL10MEN	MCL11	MCL1STDEV	LCL11	LCL12	LCL2STDEV	RIHESTDEV	SRPTC	SRPLT
1	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	0.150 999	3.81 R	3.416-4.356 0.66
2	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	5.79 R	5.274-7.001 0.54
3	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	5.79 R	5.274-7.001 0.54
4	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	5.79 R	5.274-7.001 0.54
5	60 999	999 999	SLANT UP		999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	5.79 R	5.274-7.001 0.54
6	45 R 0-90	999 999	HORIZONTAL - VERTICAL		999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	6.09 R	5.997-6.191 0.64
7	45 R 0-90	999 999	HORIZONTAL - VERTICAL		999 999	999 999	999 999	999 999	999 999	0.218 S 0.01	6.09 R	5.997-6.191 0.64
8	999 999	999 999	999 999		999 999	999 999	999 999	999 999	999 999	0.150 999	4.04 R	3.346-5.331 0.95
9	999 999	999 999	999 999		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	6.08 R	5.370-6.852 0.81
10	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	6.08 R	5.370-6.852 0.81
11	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	6.08 R	5.370-6.852 0.81
12	95 R 90-100	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	6.08 R	5.370-6.852 0.81
13	95 R 90-100	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	6.08 R	5.370-6.852 0.81
14	50 R 0-100	999 999	VERT. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.207 S 0.007	5.68 R	5.446-5.913 0.62
15	999 999	999 999	999 999		999 999	999 999	999 999	999 999	999 999	0.150 999	3.46 R	2.929-3.750 0.50
16	999 999	999 999	999 999		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	6.24 R	5.999-6.694 0.58
17	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	6.24 R	5.999-6.694 0.58
18	93 R 90-95	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	6.24 R	5.999-6.694 0.58
19	95 R 90-100	999 999	HOR. - SLIGHTLY HANGING		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	5.32 R	5.187-5.461 0.62
20	90 R 85-95	999 999	RATHER HORIZONTAL		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	5.60 R	5.512-5.678 0.72
21	45 R 0-90	999 999	HORIZONTAL - VERTICAL		999 999	999 999	999 999	999 999	999 999	0.236 S 0.005	5.60 R	5.512-5.678 0.72

Record#	SRPLTSTDEV	VM1	VM2	VM3	VM4STDEV	VM4_270	VM4_270STD	VM4_90	VM4_90STD	VMCOMMENT
1	R 0.535-0.760	999.99	999.99	999.99	999.99	22.30	S 5.7	23.60	S 5.9	SA: 0-5 CM UNDER TOPLAYER
2	R 0.434-0.603	999.99	999.99	999.99	999.99	17.80	S 2.4	21.20	S 2.9	SAMPLE: 0-5 CM DEPTH
3	R 0.434-0.603	999.99	999.99	999.99	999.99	21.80	S 1.5	24.20	S 4.1	SA: 0-5 CM UNDER TOPLAYER
4	R 0.434-0.603	999.99	999.99	999.99	999.99	35.70	S 6.8	32.30	S 5.1	SAMPLE: 0-5 CM DEPTH
5	R 0.434-0.603	999.99	999.99	999.99	999.99	35.50	S 3.4	999.99	999.99	SAMPLE: 0-5 CM DEPTH
6	R 0.630-0.655	999.99	999.99	999.99	999.99	31.60	S 1.2	999.99	999.99	SAMPLE: 0-5 CM DEPTH
7	R 0.630-0.655	999.99	999.99	999.99	999.99	21.20	S 1.8	999.99	999.99	SA: 0-5 CM UNDER TOPLAYER
8	R 0.832-1.068	999.99	999.99	999.99	999.99	21.50	S 3.6	22.80	S 2.2	SA: 0-5 CM UNDER TOPLAYER
9	R 0.674-0.968	999.99	999.99	999.99	999.99	13.10	S 3.1	20.40	S 1.7	SA: 0-5 CM UNDER TOPLAYER
10	R 0.674-0.968	999.99	999.99	999.99	999.99	22.90	S 3.2	21.50	S 1.6	SA: 0-5 CM UNDER TOPLAYER
11	R 0.674-0.968	999.99	999.99	999.99	999.99	38.70	S 4.5	37.10	S 3.4	SAMPLE: 0-5 CM DEPTH
12	R 0.674-0.968	999.99	999.99	999.99	999.99	33.60	S 2.3	999.99	999.99	SAMPLE: 0-5 CM DEPTH
13	R 0.599-0.638	999.99	999.99	999.99	999.99	38.40	S 1.9	999.99	999.99	SAMPLE: 0-5 CM DEPTH
14	R 0.599-0.638	999.99	999.99	999.99	999.99	20.60	S 2.5	999.99	999.99	SA: 0-5 CM UNDER TOPLAYER
15	R 0.392-0.573	999.99	999.99	999.99	999.99	23.50	S 3.0	22.10	S 2.0	SA: 0-5 CM UNDER TOPLAYER
16	R 0.508-0.642	999.99	999.99	999.99	999.99	19.90	S 2.0	24.90	S 1.8	SA: 0-5 CM UNDER TOPLAYER
17	999	999.99	999.99	999.99	999.99	19.30	S 1.7	21.60	S 2.0	SA: 0-5 CM UNDER TOPLAYER
18	999	999.99	999.99	999.99	999.99	34.10	S 2.7	32.80	S 3.3	SAMPLE: 0-5 CM DEPTH
19	999	999.99	999.99	999.99	999.99	32.70	S 1.5	999.99	999.99	SAMPLE: 0-5 CM DEPTH
20	R 0.574-0.867	999.99	999.99	999.99	999.99	37.30	S 1.7	999.99	999.99	SAMPLE: 0-5 CM DEPTH
21	R 0.574-0.867	999.99	999.99	999.99	999.99	21.00	S 2.3	999.99	999.99	SA: 0-5 CM UNDER TOPLAYER

Record#	FIELDREF	SPECIES	VARIETY	PHENOLOGY	PHENOCOMME	YIELD	ABNORMALTI
				HARVDATE			
1	FLO310.BEA.880422	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	BARE SOIL
2	FLO310.BEA.880502	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	999
3	FLO310.BEA.880614	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	999
4	FLO310.BEA.880705	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	999
5	FLO310.BEA.880714	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	999
6	FLO310.BEA.880726	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	BROWN SPOTS ON LEAVES
7	FLO310.BEA.880816	STEMBEANS	ALFRED	999 999 880416	880923	0.2365	LEAVES BROWN SPECKLED
8	FLO340.BEA.880422	PEAS	999	999 999 999999	99.9999	99.9999	WINTERFURROW
9	FLO340.BEA.880502	PEAS	999	999 999 999999	99.9999	99.9999	SMOOTH SURFACE
10	FLO340.BEA.880614	PEAS	999	999 999 999999	99.9999	99.9999	FIRST TWINES IN CROP
11	FLO340.BEA.880705	PEAS	999	999 999 999999	99.9999	99.9999	FIRST TWINES IN CROP
12	FLO340.BEA.880714	PEAS	999	999 999 999999	99.9999	99.9999	CROP STRAIGHT, NO LODGING
13	FLO340.BEA.880726	PEAS	999	999 999 999999	99.9999	99.9999	STUBBLES ON FIELD
14	FLO340.BEA.880816	PEAS	999	999 999 999999	99.9999	99.9999	HARROWED; SOME STUBBLES
15	FLO740.BEA.880422	PEAS	999	999 999 999999	99.9999	99.9999	BARE SOIL; HARROWED
16	FLO740.BEA.880502	PEAS	999	999 999 999999	99.9999	99.9999	BARE SOIL
17	FLO740.BEA.880614	PEAS	999	999 999 999999	99.9999	99.9999	CROP DRY
18	FLO740.BEA.880705	PEAS	999	999 999 999999	99.9999	99.9999	CROP WET
19	FLO740.BEA.880714	PEAS	999	999 999 999999	99.9999	99.9999	3/4 CROP LODGED
20	FLO740.BEA.880726	PEAS	999	999 999 999999	99.9999	99.9999	IRREGULAR SURFACE & CLOUDS
21	FLO740.BEA.880816	PEAS	999	999 999 999999	99.9999	99.9999	IRREGULAR SURFACE & CLOUDS

Record#	CROPCONDIT	GROUNDCOND	WEEDCOVER	ROWSPAC	PLANTDENS	PLANTDENS	CROPCOVER
			WCVSTDEV	PLANTSPAC	FLPSTDEV	FLDENSTDEV	CRCoVSTDEV
1	999	DRY	0	999 999 99.99	999 999 999 999	145	0 999
2	FIRST LEAVEPOINT	DRY	0	999 999 0.37	99.99 999 18.50	999 145	2 A 1
3	FIRST FLOWER	DRY	0	999 999 0.37	99.99 999 25.07	999 145	35 A 4
4	FULL FLOWERING	WET	0	999 999 0.37	99.99 999 25.07	999 145	88 A 3
5	FIRST PODS	WET	0	999 999 0.37	99.99 999 25.07	999 145	90 A 2
6	BAD CROP	MOIST	0	999 999 0.37	99.99 999 25.07	999 145	40 A 5
7	NO LOWER LEAVES	DRY	0	999 999 0.37	99.99 999 25.07	999 145	30 A 4
8	BARE SOIL	DRY, SLAKED	15	999 999 99.99	99.99 999 999 999	145	0 999
9	BARE SOIL	DRY, ROLLED	0	999 999 99.99	99.99 999 999 999	145	0 999
10	SOME FLOWERBUDS	DRY WITH CLOUDS	0	999 999 0.25	99.99 999 999 999	145	40 A 5
11	FLOWERING	WET	0	999 999 0.25	99.99 999 999 999	145	85 A 3
12	FLOWERING & PODS	WET	0	999 999 0.25	99.99 999 999 999	145	93 A 2
13	HARVESTED	MOIST	0	999 999 99.99	99.99 999 999 999	145	999 999
14	BARE SOIL	DRY	0	999 999 99.99	99.99 999 999 999	145	999 999
15	SEED SOWN IN	DRY	0	999 999 99.99	99.99 999 999 999	145	0 999
16	999	DRY; SMAL CLOUDS	0	999 999 99.99	99.99 999 999 999	145	0 999
17	FIRST TWINES	DRY	0	999 999 0.25	99.99 999 999 999	145	50 A 5
18	FLOWERING	WET	0	999 999 0.25	99.99 999 999 999	145	95 A 1
19	FLOWERING & PODS	WET	0	999 999 0.25	99.99 999 999 999	145	80 A 3
20	HARVESTED	LARGE CLOUDS	0	999 999 99.99	99.99 999 999 999	145	999 999
21	999	DRY	0	999 999 99.99	99.99 999 999 999	145	999 999

Record#	LL	LW	LLSTDEV	NLPSTDEV	UCL11	UCL12	UCL2STDEV	MCL11	MCL2STDEV
			LWSTDEV	NLPP	UCL1STDEV	UCL1COMMEN		MCL1STDEV	MCL2
1	99.999	999	99.999	999	9999.999	999	999	999	999
2	99.999	999	99.999	999	9999.999	999	999	999	999
3	99.999	999	99.999	999	9999.999	999	999	999	999
4	99.999	999	99.999	999	9999.999	53 R 45-60	999	999	999
5	99.999	999	99.999	999	9999.999	45	999	999	999
6	99.999	999	99.999	999	9999.999	23 R 0-45	999	999	999
7	99.999	999	99.999	999	9999.999	45 R 0-90	999	999	999
8	99.999	999	99.999	999	9999.999		999	999	999
9	99.999	999	99.999	999	9999.999		999	999	999
10	99.999	999	99.999	999	9999.999		999	999	999
11	99.999	999	99.999	999	9999.999		999	999	999
12	99.999	999	99.999	999	9999.999		999	999	999
13	99.999	999	99.999	999	9999.999		999	999	999
14	99.999	999	99.999	999	9999.999		999	999	999
15	99.999	999	99.999	999	9999.999		999	999	999
16	99.999	999	99.999	999	9999.999		999	999	999
17	99.999	999	99.999	999	9999.999		999	999	999
18	99.999	999	99.999	999	9999.999		999	999	999
19	99.999	999	99.999	999	9999.999		999	999	999
20	99.999	999	99.999	999	9999.999		999	999	999
21	99.999	999	99.999	999	9999.999		999	999	999

Record#	LCL11	LCL12	SRL2STDEV	SRLTCSTDEV	SRLPT	SRLTSTDEV	VMI	VMI1STDEV	VM2	VM2STDEV
1	999	999	999	999	0.70	R 0.638-0.744	0.50	R 0.392-0.603	999.99	999
2	999	999	999	999	0.72	R 0.644-0.825	0.58	R 0.557-0.593	19.40	S 0.9
3	999	999	999	999	0.46	R 0.308-0.615	0.43	999	16.70	S 4.8
4	999	999	999	999	0.46	R 0.308-0.615	0.43	999	24.10	S 3.6
5	999	999	999	999	0.46	R 0.308-0.615	0.43	999	999.99	999
6	999	999	999	999	0.46	R 0.308-0.615	0.43	999	999.99	999
7	999	999	999	999	0.46	R 0.308-0.615	0.43	999	999.99	999
8	999	999	999	999	99.99	999	99.99	999	999.99	999
9	999	999	999	999	99.99	999	99.99	999	999.99	999
10	999	999	999	999	99.99	999	99.99	999	999.99	999
11	999	999	999	999	99.99	999	99.99	999	999.99	999
12	999	999	999	999	99.99	999	99.99	999	999.99	999
13	999	999	999	999	99.99	999	99.99	999	999.99	999
14	999	999	999	999	99.99	999	99.99	999	999.99	999
15	999	999	999	999	0.76	R 0.676-0.896	0.48	R 0.463-0.500	999.99	999
16	999	999	999	999	1.13	R 0.936-1.357	0.49	R 0.373-0.615	999.99	999
17	999	999	999	999	1.13	R 0.936-1.357	0.49	R 0.373-0.615	999.99	999
18	999	999	999	999	1.13	R 0.936-1.357	0.49	R 0.373-0.615	999.99	999
19	999	999	999	999	1.13	R 0.936-1.357	0.49	R 0.373-0.615	999.99	999
20	999	999	999	999	1.13	R 0.936-1.357	0.49	R 0.373-0.615	999.99	999
21	999	999	999	999	0.84	R 0.649-1.004	0.87	R 0.836-0.904	999.99	999

Record#	VM3	VM4	VM6STDEV	VMCOMMENT	GMS	GMSSTDEV	SSTH	SSTHSTDEV
1	999.99 999	25.20 S 2.9	SA: 0-5 CM UNDER TOPLAYER	8.00 S 1.0	0.007 R	0.003-0.012		
2	21.20 S 2.7	19.70 S 1.7	SAMPLED IN 3 SEGMENTS	999.99 999	99.999 999			
3	32.00 S 5.1	26.60 S 3.9	3 SEGMENTS UNDER TOPLAYER	5.20 S 0.4	0.011 R	0.010-0.013		
4	999.99 999	39.80 S 3.5	SAMPLE: 0-5 CM DEPTH	999.99 999	99.999 999			
5	999.99 999	39.10 S 3.2	SAMPLE: 0-5 CM DEPTH	999.99 999	99.999 999			
6	999.99 999	38.00 S 2.6	SAMPLE: 0-5 CM DEPTH	999.99 999	99.999 999			
7	999.99 999	26.90 S 5.8	SA: 0-5 CM UNDER TOPLAYER	11.50 S 3.1	0.011 R	0.007-0.013		
8	999.99 999	999.99 999	999	999.99 999	99.999 999			
9	999.99 999	999.99 999	999	999.99 999	99.999 999			
10	999.99 999	999.99 999	999	999.99 999	99.999 999			
11	999.99 999	999.99 999	999	999.99 999	99.999 999			
12	999.99 999	999.99 999	999	999.99 999	99.999 999			
13	999.99 999	999.99 999	999	999.99 999	99.999 999			
14	999.99 999	999.99 999	999	999.99 999	99.999 999			
15	999.99 999	999.99 999	999	999.99 999	99.999 999			
16	999.99 999	999.99 999	999	999.99 999	99.999 999			
17	999.99 999	999.99 999	999	999.99 999	99.999 999			
18	999.99 999	999.99 999	999	999.99 999	99.999 999			
19	999.99 999	999.99 999	999	999.99 999	99.999 999			
20	999.99 999	999.99 999	999	999.99 999	99.999 999			
21	999.99 999	999.99 999	999	999.99 999	99.999 999			

Record#	GM1	GM2	GM4STDEV	GM3STDEV	GM4	GMCOMMENT
1	999.99 999	999.99 999	999.99 999	999.99 999	26.40 S 3.0	DRY TOP-LAYER SAMPLED
2	21.50 S 1.0	19.50 S 2.1	22.00 S 3.0	21.10 S 2.0	NO DRY TOP-LAYER SAMPLED	
3	16.40 S 4.2	24.00 S 3.2	29.90 S 2.9	25.50 S 2.7	DRY TOP-LAYER SAMPLED	
4	999.99 999	999.99 999	999.99 999	999.99 999	37.50 S 1.7	NO DRY TOP-LAYER SAMPLED
5	999.99 999	999.99 999	999.99 999	999.99 999	36.70 S 1.1	NO DRY TOP-LAYER SAMPLED
6	999.99 999	999.99 999	999.99 999	999.99 999	38.40 S 1.8	NO DRY TOP-LAYER SAMPLED
7	999.99 999	999.99 999	999.99 999	999.99 999	24.90 S 3.6	DRY TOP-LAYER SAMPLED
8	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
9	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
10	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
11	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
12	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
13	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
14	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
15	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
16	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
17	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
18	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
19	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
20	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999
21	999.99 999	999.99 999	999.99 999	999.99 999	999.99 999	999

Record#	FIELDREF	TIME	REFL_IR	IR_STDEV	REFL_GR	GR_STDEV	GROU_COND	CROP_COND	REMARKS
1	FLO760.WHE.880415	99.99	30.10	2.20	7.80	0.50	DRY	999	999
2	FLO760.WHE.880422	99.99	33.00	1.71	5.00	0.24	DRY	999	999
3	FLO760.WHE.880503	99.99	41.60	1.32	8.50	0.21	VARYING DRY/WET	999	999
4	FLO760.WHE.880511	99.99	41.90	1.41	3.90	0.16	DRY	999	999
5	FLO760.WHE.880519	99.99	45.80	1.26	4.80	0.13	DRY	999	999
6	FLO760.WHE.880603	99.99	46.30	1.85	4.30	0.18	DRY	999	999
7	FLO760.WHE.880614	99.99	43.30	1.51	4.00	0.16	DRY	999	999
8	FLO760.WHE.880627	99.99	39.20	0.89	4.80	0.29	DRY	999	999
9	FLO760.WHE.880714	99.99	39.10	1.00	99.99	9.99	DRY	999	999
10	FLO760.WHE.880728	99.99	18.00	2.28	7.10	0.64	WET	999	999
11	FLO760.WHE.880816	99.99	99.99	9.99	99.99	9.99	DRY	999	999
12	FLO760.WHE.880829	99.99	99.99	9.99	99.99	9.99	WET	999	999
13	FLO760.WHE.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
14	FLO540.WHE.880415	99.99	29.80	0.90	10.00	0.40	DRY	999	999
15	FLO540.WHE.880422	99.99	32.40	2.31	5.80	0.55	DRY	999	999
16	FLO540.WHE.880503	99.99	39.10	2.33	10.80	0.29	VARYING DRY/WET	999	999
17	FLO540.WHE.880511	99.99	42.30	1.59	3.90	0.13	DRY	999	999
18	FLO540.WHE.880519	99.99	47.70	0.95	4.90	0.09	DRY	999	999
19	FLO540.WHE.880603	99.99	45.70	2.38	4.30	0.25	DRY	999	999
20	FLO540.WHE.880614	99.99	43.30	1.09	4.10	0.08	DRY	999	999
21	FLO540.WHE.880627	99.99	40.40	1.40	4.30	0.11	DRY	999	999
22	FLO540.WHE.880714	99.99	44.10	0.96	99.99	9.99	DRY	999	999
23	FLO540.WHE.880728	99.99	35.80	2.88	99.99	9.99	WET	999	999
24	FLO540.WHE.880816	99.99	99.99	9.99	99.99	9.99	DRY	999	999
25	FLO540.WHE.880829	99.99	99.99	9.99	99.99	9.99	WET	999	999
26	FLO540.WHE.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
27	FLO350.WHE.880415	99.99	25.10	1.10	12.20	0.90	DRY	999	999
28	FLO350.WHE.880422	99.99	29.20	2.20	9.70	0.90	DRY	999	999
29	FLO350.WHE.880503	99.99	36.90	4.01	5.60	0.29	VARYING DRY/WET	999	999
30	FLO350.WHE.880511	99.99	47.00	2.37	5.10	0.42	DRY	999	999
31	FLO350.WHE.880519	99.99	47.40	1.32	5.70	0.40	DRY	999	999
32	FLO350.WHE.880603	99.99	43.00	1.41	4.00	0.11	DRY	999	999
33	FLO350.WHE.880614	99.99	47.20	2.02	3.90	0.13	DRY	999	999
34	FLO350.WHE.880627	99.99	46.60	1.65	4.50	0.07	DRY	999	999
35	FLO350.WHE.880714	99.99	46.60	2.09	99.99	9.99	DRY	999	999
36	FLO350.WHE.880728	99.99	32.50	2.21	6.40	0.53	WET	999	999
37	FLO350.WHE.880816	99.99	19.50	1.20	7.80	0.88	DRY	999	999
38	FLO350.WHE.880829	99.99	99.99	9.99	99.99	9.99	WET	999	999
39	FLO350.WHE.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
40	FLO722.SBT.880415	99.99	15.80	0.51	99.99	9.99	DRY	999	999
41	FLO722.SBT.880422	99.99	23.30	0.66	10.20	0.43	DRY	999	999
42	FLO722.SBT.880503	99.99	23.30	0.66	18.90	0.39	VARYING DRY/WET	999	999
43	FLO722.SBT.880511	99.99	19.60	1.08	14.40	0.50	DRY	999	999
44	FLO722.SBT.880519	99.99	19.50	1.39	12.10	0.31	DRY	999	999
45	FLO722.SBT.880603	99.99	26.90	2.38	9.80	0.35	DRY	999	999
46	FLO722.SBT.880614	99.99	34.00	2.14	11.30	0.50	DRY	999	999
47	FLO722.SBT.880627	99.99	99.99	9.99	99.99	9.99	DRY	999	999
48	FLO722.SBT.880714	99.99	47.10	2.61	99.99	9.99	DRY	999	999

Record#	FIELDREF	TIME	REFL IR	IR STDEV	REFL CR	GR STDEV	GRU_COND	CROP_COND	REMARKS
49	FL0722.SBT.880728	99.99	50.80	4.73	99.99	9.99	WET	999	999
50	FL0722.SBT.880816	99.99	52.20	1.88	5.60	0.26	WET	999	999
51	FL0722.SBT.880829	99.99	50.90	1.83	6.10	0.31	WET	999	999
52	FL0722.SBT.880907	99.99	44.50	2.22	5.50	0.60	MOIST	999	999
53	FL0512.SBT.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
54	FL0512.SBT.880422	99.99	15.60	0.27	11.40	0.14	DRY	999	999
55	FL0512.SBT.880503	99.99	21.20	0.53	20.20	0.43	VARYING DRY/WET	999	999
56	FL0512.SBT.880511	99.99	18.30	0.45	13.40	0.35	DRY	999	999
57	FL0512.SBT.880519	99.99	17.70	0.36	12.20	0.19	DRY	999	999
58	FL0512.SBT.880603	99.99	19.10	1.48	11.10	0.24	DRY	999	999
59	FL0512.SBT.880614	99.99	31.60	3.17	9.50	0.80	DRY	999	999
60	FL0512.SBT.880627	99.99	45.90	2.18	99.99	9.99	DRY	999	999
61	FL0512.SBT.880714	99.99	47.90	1.87	5.60	0.23	DRY	999	999
62	FL0512.SBT.880728	99.99	54.10	1.99	99.99	9.99	WET	999	999
63	FL0512.SBT.880816	99.99	49.90	1.96	5.70	0.34	DRY	999	999
64	FL0512.SBT.880829	99.99	50.50	1.67	6.20	0.30	WET	999	999
65	FL0512.SBT.880907	99.99	45.70	5.40	5.80	0.84	MOIST	999	999
66	FL0362.SBT.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
67	FL0362.SBT.880422	99.99	16.30	0.70	11.80	0.30	DRY	999	999
68	FL0362.SBT.880503	99.99	21.50	0.30	19.00	0.34	VARYING DRY/WET	999	999
69	FL0362.SBT.880511	99.99	18.20	0.74	14.10	0.61	DRY	999	999
70	FL0362.SBT.880519	99.99	17.70	0.47	13.70	0.18	DRY	999	999
71	FL0362.SBT.880603	99.99	20.30	0.73	12.90	0.21	DRY	999	999
72	FL0362.SBT.880614	99.99	25.60	1.91	11.00	0.82	DRY	999	999
73	FL0362.SBT.880627	99.99	42.80	2.63	99.99	9.99	DRY	999	999
74	FL0362.SBT.880714	99.99	53.10	2.63	99.99	9.99	DRY	999	999
75	FL0362.SBT.880728	99.99	50.00	2.46	6.20	0.42	WET	999	999
76	FL0362.SBT.880816	99.99	51.00	1.81	6.20	0.34	DRY	999	999
77	FL0362.SBT.880829	99.99	49.50	1.42	6.50	0.43	WET	999	999
78	FL0362.SBT.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
79	FL0710.POT.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
80	FL0710.POT.880422	99.99	13.30	0.35	8.80	0.17	DRY	999	999
81	FL0710.POT.880503	99.99	19.90	0.17	15.30	0.16	VARYING DRY/WET	999	999
82	FL0710.POT.880511	99.99	15.00	0.12	10.50	0.12	DRY	999	999
83	FL0710.POT.880519	99.99	14.70	0.50	10.20	0.23	DRY	999	999
84	FL0710.POT.880603	99.99	24.50	1.67	11.80	0.42	DRY	999	999
85	FL0710.POT.880614	99.99	35.40	2.96	7.90	0.40	DRY	999	999
86	FL0710.POT.880627	99.99	63.90	1.42	99.99	9.99	DRY	999	999
87	FL0710.POT.880714	99.99	99.99	9.99	99.99	9.99	DRY	999	999
88	FL0710.POT.880728	99.99	51.50	3.84	6.00	0.40	WET	999	999
89	FL0710.POT.880816	99.99	55.80	2.74	6.60	0.27	DRY	999	999
90	FL0710.POT.880829	99.99	55.90	2.95	7.50	0.29	WET	999	999
91	FL0710.POT.880907	99.99	45.00	2.47	6.90	0.64	MOIST	999	999
92	FL0520.POT.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
93	FL0520.POT.880422	99.99	16.10	0.34	12.10	0.29	DRY	999	999
94	FL0520.POT.880503	99.99	16.00	0.60	12.30	0.30	VARYING DRY/WET	999	999
95	FL0520.POT.880511	99.99	16.10	0.15	12.30	0.23	DRY	999	999
96	FL0520.POT.880519	99.99	15.40	0.21	11.80	0.14	DRY	999	999

Record#	FIELDREF	TIME	REFL_IR	IR_STDEV	REFL_CR	GR_STDEV	GROU_COND	CROP_COND	REMARKS
97	FLO520.POT.880603	99.99	19.50	1.11	9.90	0.24	DRY	999	999
98	FLO520.POT.880614	99.99	31.10	1.28	9.00	0.69	DRY	999	999
99	FLO520.POT.880627	99.99	99.99	9.99	99.99	9.99	DRY	999	999
100	FLO520.POT.880714	99.99	57.00	1.85	7.10	0.26	DRY	999	999
101	FLO520.POT.880728	99.99	57.20	1.77	99.99	9.99	WET	999	999
102	FLO520.POT.880816	99.99	54.50	3.78	7.20	0.38	DRY	999	999
103	FLO520.POT.880829	99.99	57.10	2.52	7.50	0.24	WET	999	999
104	FLO520.POT.880907	99.99	51.00	5.78	6.80	0.57	MOIST	999	999
105	FLO320.POT.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
106	FLO320.POT.880422	99.99	14.10	0.46	10.80	0.35	DRY	999	999
107	FLO320.POT.880503	99.99	17.00	0.32	13.20	0.25	VARYING DRY/WET	999	999
108	FLO320.POT.880511	99.99	14.50	0.24	11.60	0.12	DRY	999	999
109	FLO320.POT.880519	99.99	19.90	0.26	11.50	0.19	DRY	999	999
110	FLO320.POT.880603	99.99	17.70	1.30	9.70	0.18	DRY	999	999
111	FLO320.POT.880614	99.99	27.70	1.23	8.30	0.80	DRY	999	999
112	FLO320.POT.880627	99.99	51.90	4.08	99.99	9.99	DRY	999	999
113	FLO320.POT.880714	99.99	59.00	2.21	99.99	9.99	DRY	999	999
114	FLO320.POT.880728	99.99	52.10	2.32	6.00	0.25	WET	999	999
115	FLO320.POT.880816	99.99	55.10	5.04	7.60	0.28	DRY	999	999
116	FLO320.POT.880829	99.99	58.40	2.88	8.50	0.46	WET	999	999
117	FLO320.POT.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
118	FLO310.BEA.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
119	FLO310.BEA.880422	99.99	20.40	0.62	12.10	0.35	DRY	999	999
120	FLO310.BEA.880503	99.99	99.99	9.99	99.99	9.99	VARYING DRY/WET	999	999
121	FLO310.BEA.880511	99.99	16.70	0.44	12.10	0.21	DRY	999	999
122	FLO310.BEA.880519	99.99	22.40	0.44	11.90	0.26	DRY	999	999
123	FLO310.BEA.880603	99.99	19.60	1.19	10.70	0.42	DRY	999	999
124	FLO310.BEA.880614	99.99	27.80	4.10	8.60	0.95	DRY	999	999
125	FLO310.BEA.880627	99.99	55.80	1.89	99.99	9.99	DRY	999	999
126	FLO310.BEA.880714	99.99	54.20	3.54	99.99	9.99	DRY	999	999
127	FLO310.BEA.880728	99.99	26.90	3.79	4.10	0.42	WET	999	999
128	FLO310.BEA.880816	99.99	25.70	2.29	4.40	0.35	DRY	999	999
129	FLO310.BEA.880829	99.99	19.50	2.28	4.20	0.19	WET	999	999
130	FLO310.BEA.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999
131	FLO200.BAR.880415	99.99	99.99	9.99	99.99	9.99	DRY	999	999
132	FLO200.BAR.880422	99.99	99.99	9.99	99.99	9.99	DRY	999	999
133	FLO200.BAR.880503	99.99	99.99	9.99	99.99	9.99	VARYING DRY/WET	999	999
134	FLO200.BAR.880511	99.99	16.40	0.55	12.40	0.28	DRY	999	999
135	FLO200.BAR.880519	99.99	23.20	0.39	18.20	0.23	DRY	999	999
136	FLO200.BAR.880603	99.99	34.50	3.21	6.80	0.21	DRY	999	999
137	FLO200.BAR.880614	99.99	53.00	3.87	7.50	0.31	DRY	999	999
138	FLO200.BAR.880627	99.99	58.10	1.68	99.99	9.99	DRY	999	999
139	FLO200.BAR.880714	99.99	49.60	1.85	99.99	9.99	DRY	999	999
140	FLO200.BAR.880728	99.99	44.60	2.68	7.80	0.87	WET	999	999
141	FLO200.BAR.880816	99.99	28.20	2.72	99.99	9.99	DRY	999	999
142	FLO200.BAR.880829	99.99	16.00	0.99	6.80	0.46	WET	999	999
143	FLO200.BAR.880907	99.99	99.99	9.99	99.99	9.99	MOIST	999	999

APPENDIX III

Parameter list for the RCS Data Base

1 Input general information

Field name in dataset	Explanation
STUDYNAME	study name
EXPVYMDD	experiment date yymmdd
SITDESCRI	site description
FILEDESCRI	file description
EXPERNAME	name of experimenter
EXPERINST	experimenters institute
SYSDNAME	system name
SYSDOWNER	system owner
SYSDTYPE	system type
PLATFORM	platform
ANTTYPE	antenna type
LOC_TOP	location top
	latitude top left [DEG] [MIN] [N or S]
	longitude top left [DEG] [MIN] [E or W]
	latitude top right [DEG] [MIN] [N or S]
	longitude top right [DEG] [MIN] [E or W]
LOC_BOT	location bottom
	latitude bottom left [DEG] [MIN] [N or S]
	longitude bottom left [DEG] [MIN] [E or W]
	latitude bottom right [DEG] [MIN] [N or S]
	longitude bottom right [DEG] [MIN] [E or W]

2 Input field description

Field name in dataset	Explanation
FIELDREF	field or property unit reference number
SO_SERIES	soil series
SOIL_TYPE	soil type
LOC_FIELD	latitude of field centre [DEG] [MIN] [N or S]
	longitude of field centre [DEG] [MIN] [E or W]
FIELD_SIZE	field size [m**2]
SLOPE_ANG	slope angle [deg]
SLOPE_DIR	slope direction [deg] (N=0)
ALTITUDE	at field centre [m]

3.1 Input wheat or barley crop description

Field name in dataset	Explanation
FIELDREF	field or property unit number [NNXXX.SRT.YYMMDD]
DATOVRF	date of overflight [YYMMDD]
SPECIES	species
VARIETY	variety
PHENOLOGY	phenology
PHENOCOMME	phenology comments
SOWDATE	sowing date [YYMMDD]
HARVDATE	harvest date [YYMMDD]
YIELD	yield [kg/m**2]
ABNORMALTI	abnormalities
CROPCONDIT	crop condition
GROUNDCOND	ground condition
WEEDCOVER	weed cover mean [%]
WCOVSTDEV	weed cover standard deviation
WEEDCOVCOM	weed cover comment
ROWSPAC	row spacing mean [m]
PLANTSPAC	plant spacing mean [m]
PLSPSTDEV	plant spacing standard deviation
TILLDENS	tiller density mean [/m**2]
TILDENSTDEV	tiller density standard deviation
ROWDIR	row direction [deg] (N=0)
CROPCOVER	crop cover mean [%]
CRCOVSTDEV	crop cover standard deviation
CROPHEIGHT	crop height mean [m]
CRHEISTDEV	crop height standard deviation
PFWEARS	plant fresh weight ears mean [kg/m**2]
FEARSSTDEV	plant fresh weight ears standard deviation
PFWEARVES	plant fresh weight leaves mean [kg/m**2]
FLEAVSTDEV	plant fresh weight leaves standard deviation
PFWSTEMS	plant fresh weight stems mean [kg/m**2]
FSTEMSTDEV	plant fresh weight stems standard deviation
PFWTOTAL	plant fresh weight total mean [kg/m**2]
FTOTASTDEV	plant fresh weight total standard deviation
PDWEARS	plant dry weight ears mean [kg/m**2]
DEARSSTDEV	plant dry weight ears standard deviation
PDWEARVES	plant dry weight leaves mean [kg/m**2]
DLEAVSTDEV	plant dry weight leaves standard deviation
PDWSTEMS	plant dry weight stems mean [kg/m**2]
DSTEMSTDEV	plant dry weight stems standard deviation
PDWTOTAL	plant dry weight total mean [kg/m**2]
DTOTASTDEV	plant dry weight total standard deviation
PMCSEARS	plant moisture content ears mean [%]
PMSEARSSTDEV	plant moisture content ears standard deviation
PMCLEAVES	plant moisture content leaves mean [%]
MLEAVSTDEV	plant moisture content leaves standard deviation
PMCSTEMS	plant moisture content stems mean [%]
MSTEMSTDEV	plant moisture content stems standard deviation
PMCTOTAL	plant moisture content total mean [%]
MTOTASTDEV	plant moisture content total standard deviation
LAI	leaf area index mean [m**2/m**2]
LAISTDEV	leaf area index standard deviation

Field name in dataset	Explanation	Field name in dataset	Explanation
FL	flag leaf length mean [m]	VM2STDEV	v.s.m.c. 1-2.5 cm standard deviation
FLSTDEV	flag leaf length standard deviation	VM3	vol. soil moisture content 2.5-5cm mean [%]
FLW	flag leaf width mean [m]	VM3STDEV	v.s.m.c. 2.5-5 cm standard deviation
FLWSTDEV	flag leaf width standard deviation	VM4	vol. soil moisture content 0-5cm mean [%]
EL	ear length mean [m]	VM4STDEV	v.s.m.c. 0-5 cm standard deviation
ELSTDEV	ear length standard deviation	VMCOMMENT	vol. soil moisture content comment
DIEARFLEAF	distance between ear and flag leaf [m]	GMS	grav. surface soil moisture content mean [%]
DIEFLSTDEV	distance between ear and flag leaf standard deviation	GMSSTDEV	grav. surface s. m. c. standard deviation
CHNL	chaff needle length [m]	SSTH	surface soil thickness mean [m]
CHNLSTDEV	chaff needle length standard deviation	SSTHSTDEV	surface soil thickness standard deviation
FLO	flag leaf orientation mean [deg]	GM1	grav. soil moisture content 0-1cm mean [%]
FLOSTDEV	flag leaf orientation standard deviation	GM1STDEV	g.s.m.c. 0-1 cm standard deviation
FLOCOMMENT	flag leaf orientation comment	GM2	grav. soil moisture content 1-2.5cm mean [%]
NLPT	number of leaves per tiller mean	GM2STDEV	g.s.m.c. 1-2.5 cm standard deviation
NLPTSTDEV	number of leaves per tiller standard deviation	GM3	grav. soil moisture content 2.5-5cm mean [%]
NTPP	number of tillers per plant mean	GM3STDEV	g.s.m.c. 2.5-5 cm standard deviation
NTPPSTDEV	number of tillers per plant standard deviation	GM4	grav. soil moisture content 0-5cm mean [%]
UCLL1	upper canopy leaf inclination [deg]	GM4STDEV	g.s.m.c. 0-5 cm standard deviation
UCLL1STDEV	measurement 1	GMCOMMENT	grav. soil moisture content comment
UCLL2	upper canopy leaf inclination standard deviation		
UCLL2STDEV	measurement 1		
UCLL3	upper canopy leaf inclination [deg]		
UCLL3STDEV	measurement 2		
UCLL4	upper canopy leaf inclination standard deviation		
UCLL4STDEV	measurement 2		
MCLL1	middle canopy leaf inclination comment		
MCLL1STDEV	middle canopy leaf inclination [deg]		
MCLL2	middle canopy leaf inclination standard deviation		
MCLL2STDEV	measurement 1		
LCLL1	lower canopy leaf inclination [deg]		
LCLL1STDEV	measurement 1		
LCLL2	lower canopy leaf inclination standard deviation		
LCLL2STDEV	measurement 2		
SRPTC	soil surface roughness RMS mean		
SRPTCSTDEV	perpendicular to cultivation [cm]		
SRPLT	soil surface roughness RMS standard deviation		
SRPLTSTDEV	perpendicular to cultivation		
VM1	soil surface roughness RMS mean		
VM1STDEV	parallel to cultivation [cm]		
VM2	soil surface roughness RMS standard deviation		
	parallel to cultivation		
	vol. soil moisture content 0-1cm mean [%]		
	v.s.m.c. 0-1 cm standard deviation		
	vol. soil moisture content 1-2.5cm mean [%]		

Field name in dataset	Explanation	Field name in dataset	Explanation
FIELDREF	field or property unit number [NNXXX.SRT.YYMMDD]	LL	leaf length mean [m]
DATOVREFL	date of overflight [YYMMDD]	LLSTDEV	leaf length standard deviation
SPECIES	species	LW	leaf width mean [m]
VARIETY	variety	LWSTDEV	leaf width standard deviation
PHENOLOGY	phenology comments	NLPP	number of leaves per plant mean
PHENOCOMME	sowing date [YYMMDD]	NLPPSTDEV	number of leaves per plant standard deviation
SOWDATE	harvest date [YYMMDD]	UCLI1	upper canopy leaf inclination [deg]
HARVDATE	yield [kg/m**2]	UCLI1STDEV	upper canopy leaf inclination standard deviation
YIELD	abnormalities	UCLI2	upper canopy leaf inclination [deg]
ABNORMALTI	crop condition	UCLI2STDEV	upper canopy leaf inclination standard deviation
CROPCONDIT	ground condition	UCLICOMMEN	upper canopy leaf inclination comment
GROUNDCOND	weed cover mean [%]	MCLI1	middle canopy leaf inclination [deg]
WEEDCOVER	weed cover standard deviation	MCLI1STDEV	middle canopy leaf inclination standard deviation
WCOVSTDEV	weed cover comment	MCLI2	middle canopy leaf inclination [deg]
WEEDCOVCOM	row spacing mean [m]	MCLI2STDEV	middle canopy leaf inclination standard deviation
ROWSPAC	plant spacing standard deviation	LCLI1	lower canopy leaf inclination [deg]
PLANTSPAC	plant spacing mean [m]	LCLI1STDEV	lower canopy leaf inclination standard deviation
PLSPSTDEV	plant density standard deviation	LCLI2	lower canopy leaf inclination [deg]
PLANTDENS	plant density mean [m**2]	LCLI2STDEV	lower canopy leaf inclination standard deviation
PLDENSTDEV	plant density standard deviation	SRPTC	soil surface roughness RMS mean
ROWDIR	row direction [deg] (N=0)	SRPTCSTDEV	soil surface roughness RMS standard deviation
CROPCOVER	crop cover mean [%]	SRPLT	soil surface roughness RMS mean
CROPCOVSTDEV	crop cover standard deviation	SRPLTSTDEV	soil surface roughness RMS standard deviation
CROPHEIGHT	crop height mean [m]	VM1	vol. soil moisture content 0-1cm mean [%]
CROPHEI1STDEV	crop height standard deviation	VM1STDEV	vol. soil moisture content 0-1cm standard deviation
PLDI	plant diameter mean [m]	VM2	vol. soil moisture content 1-2.5cm mean [%]
PLDI1STDEV	plant diameter standard deviation	VM2STDEV	vol. soil moisture content 1-2.5cm standard deviation
PFWLEAVES	plant fresh weight leaves mean [kg/m**2]	VM3	vol. soil moisture content 2.5-5cm mean [%]
PFWLEAVSTDEV	plant fresh weight leaves standard deviation	VM3STDEV	vol. soil moisture content 2.5-5cm standard deviation
PFWSTEMS	plant fresh weight stems mean [kg/m**2]	VM4	vol. soil moisture content 0-5cm mean [%]
PFWSTEMSTDEV	plant fresh weight stems standard deviation	VM4STDEV	vol. soil moisture content 0-5cm standard deviation
PFWTUBER	plant fresh weight tuber mean [kg/m**2]	VMCOMMENT	vol. soil moisture content comment
PFWTUBERSTDEV	plant fresh weight tuber standard deviation	GMS	grav. surface soil moisture content mean [%]
PFWTOTAL	plant fresh weight total mean [kg/m**2]	GMSSTH	grav. surface s. m. c. standard deviation
PFWTASTDEV	plant fresh weight total standard deviation	SSTHSTDEV	surface soil thickness mean [m]
PFWLEAVES	plant dry weight leaves standard deviation		surface soil thickness standard deviation
PFWSTEMS	plant dry weight stems mean [kg/m**2]		
PFWTUBER	plant dry weight tuber mean [kg/m**2]		
PFWTOTAL	plant dry weight total mean [kg/m**2]		
PFWTASTDEV	plant dry weight total standard deviation		
PFWLEAVES	plant dry weight leaves standard deviation		
PFWSTEMS	plant dry weight stems mean [kg/m**2]		
PFWTUBER	plant dry weight tuber mean [kg/m**2]		
PFWTOTAL	plant dry weight total mean [kg/m**2]		
PFWTASTDEV	plant dry weight total standard deviation		
PFWLEAVES	plant moisture content leaves mean [%]		
PFWSTEMS	plant moisture content leaves standard deviation		
PFWTUBER	plant moisture content stems mean [%]		
PFWTOTAL	plant moisture content stems standard deviation		
PFWTASTDEV	plant moisture content tuber mean [%]		
PFWLEAVES	plant moisture content tuber standard deviation		
PFWSTEMS	plant moisture content total mean [%]		
PFWTUBER	plant moisture content total standard deviation		
PFWTOTAL	plant moisture content total mean [%]		
PFWTASTDEV	plant moisture content total standard deviation		
LAI	leaf area index mean [m**2/m**2]		
LAI1STDEV	leaf area index standard deviation		

3.3 Input potatoes crop description

Field name in dataset	Explanation
GN1	grav. soil moisture content 0-1cm mean [%]
GN1STDEV	g.s.m.c. 0-1 cm standard deviation
GN2	grav. soil moisture content 1-2.5cm mean [%]
GN2STDEV	g.s.m.c. 1-2.5 cm standard deviation
GN3	grav. soil moisture content 2.5-5cm mean [%]
GN3STDEV	g.s.m.c. 2.5-5 cm standard deviation
GN4	grav. soil moisture content 0-5cm mean [%]
GN4STDEV	g.s.m.c. 0-5 cm standard deviation
GNCOMMENT	grav. soil moisture content comment
FIELDREF	field or property unit number [NNXXXX.SRT.YYMMDD]
DATOVRF	date of overflight [YYMMDD]
SPECIES	species
VARIETY	variety
PHENOLOGY	phenology
PHENOCOMME	phenology comments
MANPRAC	management practice
SOWDATE	sowing date [YYMMDD]
HARVDATE	harvest date [YYMMDD]
YIELD	yield [kg/m**2]
ABNORMALTI	abnormalities
CROPCONDIT	crop condition
GROUNDCOND	ground condition
WEEDCOVER	weed cover mean [%]
WCOVSTDEV	weed cover standard deviation
WEEDCOVCOM	weed cover comment
ROWSPAC	row spacing mean [m]
PLANTSPAC	plant spacing mean [m]
PLSPSTDEV	plant spacing standard deviation
PLANTDENS	plant density mean [/m**2]
PLDENSTDEV	plant density standard deviation
ROWDIR	row direction [deg] (N=0)
CROPCOVER	crop cover mean [%]
CRCOVSTDEV	crop cover standard deviation
CROPHEIGHT	crop height mean [m]
CRHEISTDEV	crop height standard deviation
PLDI	plant diameter mean [m]
PLDISTDEV	plant diameter standard deviation
PFWLEAVES	plant fresh weight leaves mean [kg/m**2]
FLEAVSTDEV	plant fresh weight leaves standard deviation
PFWSTEMS	plant fresh weight stems mean [kg/m**2]
FSTEMSTDEV	plant fresh weight stems standard deviation
PFWTOTAL	plant fresh weight total mean [kg/m**2]
FTOTASTDEV	plant fresh weight total standard deviation
PWLEAVES	plant dry weight leaves mean [kg/m**2]
DLEAVSTDEV	plant dry weight leaves standard deviation
PWSTEMS	plant dry weight stems mean [kg/m**2]
DSTEMSTDEV	plant dry weight stems standard deviation
PWTOTAL	plant dry weight total mean [kg/m**2]
DTOTASTDEV	plant dry weight total standard deviation
PMCLEAVES	plant moisture content leaves mean [%]
MLEAVSTDEV	plant moisture content leaves standard deviation
PMCSTEMS	plant moisture content stems mean [%]
MSTEMSTDEV	plant moisture content stems standard deviation
PMCTOTAL	plant moisture content total mean [%]
MTOTASTDEV	plant moisture content total standard deviation
LAI	leaf area index mean [m**2/m**2]
LAISTDEV	leaf area index standard deviation
LL	leaf length mean [m]
LLSTDEV	leaf length standard deviation
LW	leaf width mean [m]
LWSTDEV	leaf width standard deviation

Field name in dataset	Explanation	Field name in dataset	Explanation
NLPP	number of leaves per plant mean	VMCOMMENT	vol. soil moisture content comment
NLPPSTDEV	number of leaves per plant standard deviation	GMS	grav. surface soil moisture content mean [%]
NSPP	number of stems per plant mean	GMSSTDEV	grav. surface s. m. c. standard deviation
NSPPSTDEV	number of stems per plant standard deviation	GMS_270	grav. surface soil moisture content mean [%] ridge side 270½ oriented of rowdirection
UCLI1	upper canopy leaf inclination [deg]	GMS_270STD	grav. surface s. m. c. standard deviation ridge side 270½ oriented of rowdirection
UCLI1STDEV	upper canopy leaf inclination standard deviation	GMS_90	grav. surface soil moisture content mean [%] ridge side 90½ oriented of rowdirection
UCLI2	upper canopy leaf inclination [deg]	GMS_90STD	grav. surface s. m. c. standard deviation ridge side 90½ oriented of rowdirection
UCLI2STDEV	upper canopy leaf inclination standard deviation	SSTH	surface soil thickness mean [m]
UCLICOMMEN	upper canopy leaf inclination comment	SSTHSTDEV	surface soil thickness standard deviation
MCLI1	middle canopy leaf inclination [deg]	SSTH_270	surface soil thickness mean [m] ridge side 270½ oriented of rowdirection
MCLI1STDEV	middle canopy leaf inclination standard deviation	SSTH_270STD	surface soil thickness standard deviation ridge side 270½ oriented of rowdirection
MCLI2	middle canopy leaf inclination [deg]	SSTH_90	surface soil thickness mean [m] ridge side 90½ oriented of rowdirection
MCLI2STDEV	middle canopy leaf inclination standard deviation	SSTH_90STD	surface soil thickness standard deviation ridge side 90½ oriented of rowdirection
LCLI1	lower canopy leaf inclination [deg]	GM1	grav. soil moisture content 0-1cm mean [%]
LCLI1STDEV	lower canopy leaf inclination standard deviation	GM2	grav. soil moisture content 1-2.5cm mean [%]
LCLI2	lower canopy leaf inclination [deg]	GM2STDEV	g.s.m.c. 1-2.5 cm standard deviation
LCLI2STDEV	lower canopy leaf inclination standard deviation	GM3	grav. soil moisture content 2.5-5cm mean [%]
RIHEI	ridge height mean [m]	GM3STDEV	g.s.m.c. 2.5-5 cm standard deviation
RIHESTDEV	ridge height standard deviation	GM4	grav. soil moisture content 0-5cm mean [%]
SRPTC	soil surface roughness RMS mean	GM4STDEV	g.s.m.c. 0-5 cm standard deviation
SRPTCSTDEV	soil surface roughness RMS standard deviation	GM4_270	grav. soil moisture content 0-5cm mean [%] ridge side 270½ oriented of rowdirection
SRPLT	perpendicular to cultivation	GM4_270STD	g.s.m.c. 0-5 cm standard deviation ridge side 270½ oriented of rowdirection
SRPLTSTDEV	soil surface roughness RMS mean	GM4_90	grav. soil moisture content 0-5cm mean [%] ridge side 90½ oriented of rowdirection
VM1	parallel to cultivation	GM4_90STD	g.s.m.c. 0-5 cm standard deviation ridge side 90½ oriented of rowdirection
VM1STDEV	vol. soil moisture content 0-1cm mean [%]	GMCOMMENT	grav. soil moisture content comment
VM2	v.s.m.c. 0-1 cm standard deviation		
VM2STDEV	vol. soil moisture content 1-2.5cm mean [%]		
VM3	v.s.m.c. 1-2.5 cm standard deviation		
VM3STDEV	vol. soil moisture content 2.5-5cm mean [%]		
VM4	v.s.m.c. 2.5-5 cm standard deviation		
VM4STDEV	vol. soil moisture content 0-5cm mean [%]		
VM4_270	vol. soil moisture content 0-5cm mean [%] ridge side 270½ oriented of rowdirection		
VM4_270STD	v.s.m.c. 0-5 cm standard deviation ridge side 270½ oriented of rowdirection		
VM4_90	vol. soil moisture content 0-5cm mean [%] ridge side 90½ oriented of rowdirection		
VM4_90STD	v.s.m.c. 0-5 cm standard deviation ridge side 90½ oriented of rowdirection		

3.4 Input beans crop description

Field name in dataset	Explanation	Field name in dataset	Explanation
FIELDREF	field or property unit number [NNXXXX.SRT.YYMMDD]	LL	leaf length mean [m]
DATEOVRFL	date of overflight [YYMMDD]	LLSTDEV	leaf length standard deviation
SPECIES	species	LW	leaf width mean [m]
VARIETY	variety	LWSTDEV	leaf width standard deviation
PHENOLOGY	phenology	NLPP	number of leaves per plant mean
PHENOCOMME	phenology comments	NLPPSTDEV	number of leaves per plant standard deviation
SOWDATE	sowing date [YYMMDD]	UCLI1	upper canopy leaf inclination [deg]
HARVDATE	harvest date [YYMMDD]	UCLI1STDEV	upper canopy leaf inclination standard deviation
YIELD	yield [kg/m**2]	UCLI2	measurement 1
ABNORMALTI	abnormalities	UCLI2STDEV	measurement 1 standard deviation
CROPCONDIT	crop condition	UCL2STDEV	measurement 2
GROUNDCOND	ground condition	UCL2STDEV	measurement 2 standard deviation
WEEDCOVER	weed cover mean [%]	UCLICOMMEN	upper canopy leaf inclination comment
WEEDCOVERSTDEV	weed cover standard deviation	MCLI1	middle canopy leaf inclination [deg]
WEEDCOVERCOM	weed cover comment	MCLI1STDEV	middle canopy leaf inclination standard deviation
ROWSPAC	row spacing mean [m]	MCLI2	measurement 1
PLANTSPAC	plant spacing mean [m]	MCLI2STDEV	measurement 1 standard deviation
PLSPSTDEV	plant spacing standard deviation	LCLI1	lower canopy leaf inclination [deg]
PLANTDENS	plant density mean [/m**2]	LCLI1STDEV	lower canopy leaf inclination standard deviation
PLDENSTDEV	plant density standard deviation	LCLI2	measurement 1
ROWDIR	row direction [deg] (N=0)	LCLI2STDEV	measurement 1 standard deviation
CROPCOVER	crop cover mean [%]	SRPTC	soil surface roughness RMS mean
CROPCOVERSTDEV	crop cover standard deviation	SRPTCSTDEV	soil surface roughness RMS standard deviation
CROPHEIGHT	crop height standard deviation	SRPLT	soil surface roughness RMS mean
CRHEISTDEV	crop height mean [m]	SRPLTSTDEV	soil surface roughness RMS standard deviation
PFWLEAVES	plant fresh weight leaves mean [kg/m**2]	VM1	vol. soil moisture content 0-1cm mean [%]
PFWLEAVESSTDEV	plant fresh weight leaves standard deviation	VM1STDEV	vol. soil moisture content 0-1cm standard deviation
PFWSTEMS	plant fresh weight stems mean [kg/m**2]	VM2	vol. soil moisture content 1-2.5cm mean [%]
PFWSTEMSTDEV	plant fresh weight stems standard deviation	VM2STDEV	vol. soil moisture content 1-2.5cm standard deviation
PFWPODS	plant fresh weight pods mean [kg/m**2]	VM3	vol. soil moisture content 2.5-5cm mean [%]
PFWPODSTDEV	plant fresh weight pods standard deviation	VM3STDEV	vol. soil moisture content 2.5-5cm standard deviation
PFWTOTAL	plant fresh weight total mean [kg/m**2]	VM4	vol. soil moisture content 0-5cm mean [%]
PFWTOTALSTDEV	plant fresh weight total standard deviation	VM4STDEV	vol. soil moisture content 0-5cm standard deviation
PDMLEAVES	plant dry weight leaves mean [kg/m**2]	VNCOMMENT	vol. soil moisture content comment
PDMLEAVESSTDEV	plant dry weight leaves standard deviation	GMS	grav. surface soil moisture content mean [%]
PDMSTEMS	plant dry weight stems mean [kg/m**2]	GMSSTDEV	grav. surface s. m. C. standard deviation
PDMSTEMSTDEV	plant dry weight stems standard deviation	SSTK	surface soil thickness mean [m]
PDMPODS	plant dry weight pods mean [kg/m**2]	SSTKSTDEV	surface soil thickness standard deviation
PDMPODSTDEV	plant dry weight pods standard deviation		
PDMTOTAL	plant dry weight total mean [kg/m**2]		
PDMTOTALSTDEV	plant dry weight total standard deviation		
MLEAVSTDEV	plant moisture content leaves standard deviation		
MSTEMSTDEV	plant moisture content stems standard deviation		
MPODSTDEV	plant moisture content pods standard deviation		
MPTOTAL	plant moisture content total mean [%]		
MPTOTALSTDEV	plant moisture content total standard deviation		
LAI	leaf area index mean [m**2/m**2]		
LAISTDEV	leaf area index standard deviation		

Field name in dataset	Explanation	Field name in dataset	Explanation
GM1	grav. soil moisture content 0-1cm mean [%]	FIELDREF	field or property unit number [NNXXXX.SRT.YYMMDD]
GM1STDEV	g.s.m.c. 0-1 cm standard deviation	DATOVREFL	date of overflight [YYMMDD]
GM2	grav. soil moisture content 1-2.5cm mean [%]	SPECIES	species
GM2STDEV	g.s.m.c. 1-2.5 cm standard deviation	VARIETY	variety
GM3	grav. soil moisture content 2.5-5cm mean [%]	PHENOLOGY	phenology comments
GM3STDEV	g.s.m.c. 2.5-5 cm standard deviation	SOWING DATE [YYMMDD]	sowing date [YYMMDD]
GM4	grav. soil moisture content 0-5cm mean [%]	HARVEST DATE [YYMMDD]	harvest date [YYMMDD]
GM4STDEV	g.s.m.c. 0-5 cm standard deviation	YIELD [kg/m**2]	yield [kg/m**2]
GMCOMMENT	grav. soil moisture content comment	ABNORMALTIES	abnormalities
		CROPCONDITION	crop condition
		GROUNDCOND	ground condition
		WEEDCOVER	weed cover mean [%]
		WCOVSTDEV	weed cover standard deviation
		WEEDCOVCOM	weed cover comment
		ROWSPAC	row spacing mean [m]
		PLANTSPAC	plant spacing mean [m]
		PLSPSTDEV	plant spacing standard deviation
		PLANTDENS	plant density mean [/m**2]
		PLDENSTDEV	plant density standard deviation
		ROWDIR	row direction [deg] (N=0)
		CROPCOVER	crop cover mean [%]
		CRCOVSTDEV	crop cover standard deviation
		CROPHEIGHT	crop height mean [m]
		CRHEISTDEV	crop height standard deviation
		PFWCOBS	plant fresh weight cobs mean [kg/m**2]
		FCOBSSTDEV	plant fresh weight cobs standard deviation
		PFWLEAVES	plant fresh weight leaves mean [kg/m**2]
		FLEAVSTDEV	plant fresh weight leaves standard deviation
		PFWSTEMS	plant fresh weight stems mean [kg/m**2]
		FSTEMSTDEV	plant fresh weight stems standard deviation
		PFWTOTAL	plant fresh weight total mean [kg/m**2]
		FTOTASTDEV	plant fresh weight total standard deviation
		PFWCOBS	plant dry weight cobs mean [kg/m**2]
		DCOBSSTDEV	plant dry weight cobs standard deviation
		PDWLEAVES	plant dry weight leaves mean [kg/m**2]
		DLEAVSTDEV	plant dry weight leaves standard deviation
		PDWSTEMS	plant dry weight stems mean [kg/m**2]
		DSTEMSTDEV	plant dry weight stems standard deviation
		PDWTOTAL	plant dry weight total mean [kg/m**2]
		DTOTASTDEV	plant dry weight total standard deviation
		PWCCOBS	plant moisture content cobs mean [%]
		MCOBSSTDEV	plant moisture content cobs standard deviation
		PWCLEAVES	plant moisture content leaves mean [%]
		MLEAVSTDEV	plant moisture content leaves standard deviation
		PWCSTEMS	plant moisture content stems mean [%]
		MSTEMSTDEV	plant moisture content stems standard deviation
		PWCTOTAL	plant moisture content total mean [%]
		MTOTASTDEV	plant moisture content total standard deviation
		LAI	leaf area index mean [m**2/m**2]
		LAISTDEV	leaf area standard deviation

3.7 Input bare soil crop description

Field name in dataset	Explanation
GM1	grav. soil moisture content 0-1cm mean [%]
GM1STDEV	g.s.m.c. 0-1 cm standard deviation
GM2	grav. soil moisture content 1-2.5cm mean [%]
GM2STDEV	g.s.m.c. 1-2.5 cm standard deviation
GM3	grav. soil moisture content 2.5-5cm mean [%]
GM3STDEV	g.s.m.c. 2.5-5 cm standard deviation
GM4	grav. soil moisture content 0-5cm mean [%]
GM4STDEV	g.s.m.c. 0-5 cm standard deviation
GMCOMMENT	grav. soil moisture content comment
FIELDREF	field or property unit number [NNXXX.SRT.YMMDD]
DATOVRFPL	date of overflight {YYMMDD}
SRPTC	soil surface roughness RMS mean
SRPTCSTDEV	perpendicular to cultivation [cm]
SRPLT	soil surface roughness RMS standard deviation
SRPLTSTDEV	perpendicular to cultivation
VM1	vol. soil moisture content 0-1cm mean [%]
VM1STDEV	v.s.m.c. 0-1 cm standard deviation
VM2	vol. soil moisture content 1-2.5cm mean [%]
VM2STDEV	v.s.m.c. 1-2.5 cm standard deviation
VM3	vol. soil moisture content 2.5-5cm mean [%]
VM3STDEV	v.s.m.c. 2.5-5 cm standard deviation
VM4	vol. soil moisture content 0-5cm mean [%]
VM4STDEV	v.s.m.c. 0-5 cm standard deviation
VM5	vol. soil moisture content 5-10 cm mean [%]
VM5STDEV	v.s.m.c. 5-10 cm standard deviation
VM10	vol. soil moisture content 10-15 cm mean [%]
VM10STDEV	v.s.m.c. 10-15 cm standard deviation
VM15	vol. soil moisture content 15-20 cm mean [%]
VM15STDEV	v.s.m.c. 15-20 cm standard deviation
VMCOMMENT	vol. soil moisture content comment
GM1STDEV	grav. soil moisture content 0-1cm mean [%]
GM2	grav. soil moisture content 1-2.5cm mean [%]
GM2STDEV	g.s.m.c. 1-2.5 cm standard deviation
GM3	grav. soil moisture content 2.5-5cm mean [%]
GM3STDEV	g.s.m.c. 2.5-5 cm standard deviation
GM4	grav. soil moisture content 0-5cm mean [%]
GM4STDEV	g.s.m.c. 0-5 cm standard deviation
GMCOMMENT	grav. soil moisture content comment
SOILTEXT	soil texture
ORICULT	orientation of cultivation [deg]

4 Input reflection parameters

Field name in dataset	Explanation
FIELDREF	field or property unit number [NNXXXX.SRF.YYMMDD]
TIME	time of measurement [HH.MM]
REFL_IR	infra-red reflection mean [%]
IR_STDEV	infra-red reflection standard deviation
REFL_GR	green reflection mean [%]
GR_STDEV	green reflection standard deviation
GROU_COND	ground condition
CROU_COND	crop condition
REMARKS	remarks

5 Input individual overpass parameters

Field name in dataset	Explanation
DATEOVER	date of overpass [YYMMDD]
TIMEOVER	time of overpass [HH.MM]
POLARISAT	polarisation
INCIANGLE	incidence angle [deg]
WINDSPEED	wind speed [m/s]
WTSPCOMEN	wind speed comment
WINDDIR	wind direction [deg]
WIDICOMEN	wind direction comment
PRECIPAT1	precipitation 1 hour prior overpass
PRECIPAT4	precipitation 4 hours prior overpass
PRECIPAT12	precipitation 12 hours prior overpass
PRECIPAT24	precipitation 24 hours prior overpass
PRECCOMEN	precipitation comment
AIRTEMP	air temperature [deg C]
AIRTEMPCOM	air temperature comment
HUMIDITY	humidity [%]
HUMIDITYCOM	humidity comment
DIRSUNLIGH	direct sunlight [hours]
DIRSUNCOM	direct sunlight comment
CLOUDCOVER	cloud cover [%]
CLOUDCOVERCOM	cloud cover comment
SENSHEIGHT	sensor height [m]
LOOKDIR	look direction [deg]
FREQUENCY1	[GHz]
CALIBR1	calibration frequency 1 [dB]
PRF1	PRF frequency 1 [KHz]
PLSLENGTH1	pulse length-frequency 1 [NS]
RESOLSL1	resolution slant range frequency 1 [m]
RESOLGR1	resolution ground range frequency 1 [m]
TRANSPW1	transmitted power frequency 1 [mW]
DYNRAN1	dynamic range frequency 1 [dB]
BNWI3DB1	3dB beamwidth frequency 1 [deg]
FREQUENCY2	[GHz]
CALIBR2	calibration frequency 2 [dB]
PRF2	PRF frequency 2 [KHz]
PLSLENGTH2	pulse length frequency 2 [NS]
RESOLSL2	resolution slant range frequency 2 [m]
RESOLGR2	resolution ground range frequency 2 [m]
TRANSPW2	transmitted power frequency 2 [mW]
DYNRAN2	dynamic range frequency 2 [dB]
BNWI3DB2	3dB beamwidth frequency 2 [deg]
FREQUENCY3	[GHz]
CALIBR3	calibration frequency 3 [dB]
PRF3	PRF frequency 3 [KHz]
PLSLENGTH3	pulse length frequency 3 [NS]
RESOLSL3	resolution slant range frequency 3 [m]
RESOLGR3	resolution ground range frequency 3 [m]
TRANSPW3	transmitted power frequency 3 [mW]
DYNRAN3	dynamic range frequency 3 [dB]

6.3 Input RCS - Measurement data with confidence levels (1)
frequency 4, frequency 5, frequency 6

Field name in dataset	Explanation
F6RCSMEAN	frequency 6 RCS - measurement mean
F6RCSSTDEV	frequency 6 RCS - measurement standard deviation
NR6SAMPLES	frequency 6 number of samples
CONLV605	confidence level frequency 6 5%
CONLV610	confidence level frequency 6 10%
CONLV615	confidence level frequency 6 15%
CONLV620	confidence level frequency 6 20%
CONLV625	confidence level frequency 6 25%
CONLV630	confidence level frequency 6 30%
CONLV635	confidence level frequency 6 35%
CONLV640	confidence level frequency 6 40%
CONLV645	confidence level frequency 6 45%
CONLV650	confidence level frequency 6 50%
CONLV655	confidence level frequency 6 55%
CONLV660	confidence level frequency 6 60%
CONLV665	confidence level frequency 6 65%
CONLV670	confidence level frequency 6 70%
CONLV675	confidence level frequency 6 75%
CONLV680	confidence level frequency 6 80%
CONLV685	confidence level frequency 6 85%
CONLV690	confidence level frequency 6 90%
CONLV695	confidence level frequency 6 95%

Field name in dataset	Explanation
FIELDREF	field or property unit reference number
TIMEOVER	NNXXX.SRT.YMMDD
INCANGLE	time of overpass [HH.MM]
F4RCSMEAN	incidence angle [deg]
F4RCSSTDEV	frequency 4 RCS - measurement mean
NR4SAMPLES	frequency 4 RCS - measurement standard deviation
CONLV405	confidence level frequency 4 5%
CONLV410	confidence level frequency 4 10%
CONLV415	confidence level frequency 4 15%
CONLV420	confidence level frequency 4 20%
CONLV425	confidence level frequency 4 25%
CONLV430	confidence level frequency 4 30%
CONLV435	confidence level frequency 4 35%
CONLV440	confidence level frequency 4 40%
CONLV445	confidence level frequency 4 45%
CONLV450	confidence level frequency 4 50%
CONLV455	confidence level frequency 4 55%
CONLV460	confidence level frequency 4 60%
CONLV465	confidence level frequency 4 65%
CONLV470	confidence level frequency 4 70%
CONLV475	confidence level frequency 4 75%
CONLV480	confidence level frequency 4 80%
CONLV485	confidence level frequency 4 85%
CONLV490	confidence level frequency 4 90%
CONLV495	confidence level frequency 4 95%
F5RCSMEAN	frequency 5 RCS - measurement mean
F5RCSSTDEV	frequency 5 RCS - measurement standard deviation
NR5SAMPLES	frequency 5 number of samples
CONLV505	confidence level frequency 5 5%
CONLV510	confidence level frequency 5 10%
CONLV515	confidence level frequency 5 15%
CONLV520	confidence level frequency 5 20%
CONLV525	confidence level frequency 5 25%
CONLV530	confidence level frequency 5 30%
CONLV535	confidence level frequency 5 35%
CONLV540	confidence level frequency 5 40%
CONLV545	confidence level frequency 5 45%
CONLV550	confidence level frequency 5 50%
CONLV555	confidence level frequency 5 55%
CONLV560	confidence level frequency 5 60%
CONLV565	confidence level frequency 5 65%
CONLV570	confidence level frequency 5 70%
CONLV575	confidence level frequency 5 75%
CONLV580	confidence level frequency 5 80%
CONLV585	confidence level frequency 5 85%
CONLV590	confidence level frequency 5 90%
CONLV595	confidence level frequency 5 95%