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**FOX FARM, UPPER SWELL, GLOUCESTERSHIRE**

**AGRICULTURAL LAND CLASSIFICATION**

Report of Survey

## 1. Introduction

In October 1990 an Agricultural Land Classification (ALC) at Fox Farm, Upper Swell, Gloucestershire, was carried out in response to an ad hoc planning application made to Gloucestershire County Council. The survey area was 60 ha and was bounded by the B4077 to the north and Kinetonhill Farm Road to the west.

The field work was conducted by the Resource Planning Group at an approximate observation density of one auger boring per hectare. At total of 57 borings, 9 topsoil stoniness assessment pits and 5 soil pits were examined.

## 2. Agricultural Land Classification (ALC)

2.1 The ALC provides a frame work for classifying land according to the extent to which its physical or chemical characteristics impose long-term limitations on its use for agriculture. The grading refers to the top 120 cm of the profile. The distribution of ALC grades is detailed below and illustrated on the accompanying ALC map at a scale of 1:10000. The information is accurate at this scale, but any enlargement would be misleading.

Table 1: Distribution of ALC grades

| Grade | Area (ha) | % of Survey area | % of Agricultural land |
|---|---|---|---|
| 2 | 10.2 | 17 | 17.5 |
| 3A | 17.3 | 29 | 29.6 |
| 3B | 30.9 | 50 | 52.9 |
| Non ag | 1.6 | 3 | |
| | 60 | 100 | 100 (58.4 ha) |

2.2 Climate

Estimates of important climatic variables were obtained for the site by interpretation from a 5 km grid database in order to assess any overall climatic limitation. The indicative parameters for assessing such a limitation are accumulated temperature (a measure of the relative warmth of a locality) and average annual rainfall (a measure of overall wetness). The results (shown in table 2) revealed that there is a climatic limitation affecting the site restricting the ALC to grade 2 or below. Localised evidence of exposure is no more restricting.

Table 2: Climatic limitations

| | |
|---|---|
| Grid ref | SP135280 |
| Height | 185 |
| Accumulated temperature ($^{o}$ days) | 1301 |
| Average annual rainfall (mm) | 787 |
| Field capacity (days) | 179 |
| Moisture deficit, wheat (mm) | 82 |
| Moisture deficit, potatoes (mm) | 66 |
| Overall climatic grade | 2 |

## 2.3 Grade 2

There are two small areas of grade 2 land, in the centre of the survey area and in the east. In these areas there is no evidence of wetness and the stoney horizon below 55 cm, found to be 58% stone >2 cm in a soil pit dug, does not restrict the available water in the profile. The wetness class I and topsoil textures of medium clay loams combine to asign the area to ALC grade 2. The areas are limited to the same grade by climatic factors and soil workability. A soil pit dug in this area confirmed that the areas were in wetness class 1 and that the stone percentage in the lowest horizon did not create a droughtiness problem. There are negligible topsoil stones in this map unit.

## 2.4 Sub-Grade 3A

One third of the survey area has been graded as sub-grade 3A. This area has evidence of wetness and a soil pit confirmed that there is a slowly permeable layer (SPL) below 45 cm. This limits the area to wetness class 3, which with medium clay loam topsoils textures places the area into sub-grade 3A. There are some patches of stoney topsoils, but topsoil stone assessments show these are not as stoney as other parts of the site and so here are also graded as 3A.

## 2.5 Sub-Grade 3B

Half of the survey area has been graded sub-grade 3b. This is for two reasons. The area to the west and south has large percentages of topsoil stones particularly over 6 cm. These act as an impedement to cultivations, crop growth and reduce the available water capacity of the soil. Stone percentages in the top 25 cm restrict the area to sub-grade 3B, however the stone percentage at depth do not provide a droughtiness limitation because the climatic regime in the area creates a low moisture deficit and soil pits show that roots can penetrate the fissured limestone to significant depths to obtain moisture. Typical stone percentages (found by sieving and weighing) in the top 25 cm are 15% for stones >6 cm and 20-25% > 2 cm. There was no evidence of wetness in the profiles in this part of the site.

The north east part of the site has a more severe wetness limitation than the area of 3A and thus is also sub-grade 3B. A soil pit confirmed that there was an SPL from 40 cm which assigns the area to wetness class 4. Topsoils had working textures of medium clay loams and so for the prevailing FCD of 179 the area is graded 3B.

## 2.6 Non Agricultural Land

There is a small area of old woodland in the centre of the site which has been mapped as non agricultural land.

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Fox Farm<br>Upperswell<br>Glos | 1<br>DATE<br>8.10.90 | 2° NE<br>GRID REFERENCE<br>41312278 | Arable | Av Rainfall :- 787<br>ATO :- 1301<br>FC Days :- 179<br>Climatic grade:- 2 | Limestone |

| Horizon Number | Lowest Av Depth | Matrix and Ped Face Colours | Texture | Stoniness: Size, Shape, Type, and Field Method | Mottling Abundance, Contrast Size and Colour | Structure: Development Size and Shape | Pores and Fissures | Structural Condition | Consistence | Roots Abundance Size and Nature | Calcium Carbonate Content | Mangan Concs etc | Horizon Boundary: Distinctness and Form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | 10YR43 | MCL | 10% sieve (10% > 6cm) | none | - | common | | friable | common | | none | clear |
| 2 | 30 | 10YR66 | C | 25% sieve (10% > 6cm) | none | too diff. to assess because of stone content assume good structure | | | | common | | none | clear |
| 3 | 50 | 10YR66 | C | 35% sieve (10% > 6cm) | none | " | " | " | " | common | | | |
| 4 | 70+ | 10YR66 | C | 25% sieve (10% > 6cm) | none | " | " | " | " | few | | | |

Depth to Slowly Permeable Horizon :- None

Wetness Class :- 1

Wetness Grade :- 2

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Available Water Wheat :- 128

Potatoes :-

Moisture Deficit Wheat :- 82

Potatoes :-

Moisture Balance Wheat :- 45

Potatoes :-

Droughtiness Grade :- 1

Final ALC Grade :- 3a

Main Limiting Factor(s) :- Topsoil stone content > 6cm

Remarks :- Pit 3B map unit topsoil contents greater than estimated in sieve.

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Fox Farm | 2 | 1° NE | Arable | Av Rainfall :- 787<br>ATO :- 1301<br>FC Days :- 179<br>Climatic grade:- 2 | Limestone |
| | DATE<br>9.10.90 | GRID REFERENCE<br>41342280 | | | |

| Horizon Number | Lowest Av Depth | Matrix and Ped Face Colours | Texture | Stoniness: Size, Shape, Type, and Field Method | Mottling Abundance, Contrast Size and Colour | Structure: Development Size and Shape | Pores and Fissures | Structural Condition | Consistence | Roots Abundance Size and Nature | Calcium Carbonate Content | Mangan Concs etc | Horizon Boundary: Distinctness and Form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 23 | 10YR44 | MCL | < 1% eye | none | - | common | - | - | common | - | none | gradual wavy |
| 2 | 45 | 10YR46 | HCL | 0 | none | mdc sa | common | moderate | firm | few | - | few | distinct & wavy |
| 3 | 83+ | 10YR64 | C | none | cdogm | sdmp | few | poor | v. firm | few through peds | - | none | |
| Pit dug to 83 cm | | | | | | | | | | | | | |

Depth to Slowly Permeable Horizon :- 45 cm

Wetness Class :- III

Wetness Grade :- 3a

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Available Water Wheat :- 173

Potatoes :-

Moisture Deficit Wheat :- 82

Potatoes :-

Moisture Balance Wheat :-

Potatoes :-

Droughtiness Grade :- 1

Final ALC Grade :- 3a

Main Limiting Factor(s) :- Soil wetness

Remarks :-

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Fox Farm | 3 | 0° | Arable winter cereal | Av Rainfall :- 787<br>ATO :-1301<br>FC Days :- 179<br>Climatic grade:- 2 | Limestone |
| | DATE<br>10.10.90 | GRID REFERENCE<br>41372280 | | | |

| Horizon Number | Lowest Av Depth | Matrix and Ped Face Colours | Texture | Stoniness: Size, Shape, Type, and Field Method | Mottling Abundance, Contrast Size and Colour | Structure: Development Size and Shape | Pores and Fissures | Structural Condition | Consistence | Roots Abundance Size and Nature | Calcium Carbonate Content | Mangan Concs etc | Horizon Boundary: Distinctness and Form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0-25 | 10YR4/4 | MCL | none | fdom | | common | | | common | | few | abrupt<br>wavy |
| 2 | 40 | 10YR5/3 | C | occasional<br>flaggy | vcdom | WDAB Med | > 0.5%<br>0.5 mm | poor | firm | common | | common | clear<br>wavy |
| 3 | 90+ | 5Y5/2 | C | occasional<br>flaggy | cfom | SDMP Med | common<br>< 0.5 mm<br>But <0.5%<br>> 0.5 mm | poor | v. firm | few | common<br>weathered<br>limestone | none | |

Depth to Slowly Permeable Horizon :- 40

Wetness Class :- IV

Wetness Grade :- 3b

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Available Water Wheat :-

Potatoes :- Not limiting

Moisture Deficit Wheat :-

Potatoes :-

Moisture Balance Wheat :-

Potatoes :-

Droughtiness Grade :-

Final ALC Grade :- 3b

Main Limiting Factor(s) :- Soil wetness

Remarks :-

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Fox Farm | 4 | 0° | Autumn cereal | Av Rainfall :- 787<br>ATO :-1301<br>FC Days :- 179<br>Climatic grade:- 2 | Limestone |
| | DATE<br>26.10.90 | GRID REFERENCE<br>41352277 | | | |

| Horizon Number | Lowest Av Depth | Matrix and Ped Face Colours | Texture | Stoniness: Size, Shape, Type, and Field Method | Mottling Abundance, Contrast Size and Colour | Structure: Development Size and Shape | Pores and Fissures | Structural Condition | Consistence | Roots Abundance Size and Nature | Calcium Carbonate Content | Mangan Concs etc | Horizon Boundary: Distinctness and Form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topsoil | 0-22 | 10YR43 | MCL | negligible | none | | | | | common | | none | abrupt smooth |
| Sub 1 | 22-55 | 10YR44 matrix 10YR43 ped skin | HCL | none | none | Moderate CSAB | < 0.5% | Moderate | Firm | Common fine through peds | | few | |
| Sub 2 | 55-75 | 10YR54 | HCL | 58%>2mm (18% >2cm by sieve 40% >2mm by displacement) | Not mottled | Diff to assess due to high stone content Assumed moderate conditions | | | | Roots observed down to 75, assumed that they can penetrate the large cracks in the limestone. | | | |
| | | | | Stones increase below 75, cannot penetrate by spade. | | | | | | | | | |

Depth to Slowly Permeable Horizon :- none

Wetness Class :- I

Wetness Grade :- 2

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Available Water Wheat :- 128

Potatoes :-

Moisture Deficit Wheat :- 83

Potatoes :-

Moisture Balance Wheat :- 45

Potatoes :-

Droughtiness Grade :- 1

Final ALC Grade :- 2

Main Limiting Factor(s) :- Climate/soil workability

Remarks :- Stone soft scratchable limestone

| SITE NAME | PROFILE NUMBER | SLOPE AND ASPECT | LAND USE | | PARENT MATERIAL |
|---|---|---|---|---|---|
| Fox Farm | 5 | 4° | Autumn Cereals | Av Rainfall :- 789<br>ATO :- 1301<br>FC Days :- 179<br>Climatic grade:- 2 | Limestone |
| | DATE<br>26.10.90 | GRID REFERENCE<br>41322280 | | | |

| Horizon Number | Lowest Av Depth | Matrix and Ped Face Colours | Texture | Stoniness: Size, Shape, Type, and Field Method | Mottling Abundance, Contrast Size and Colour | Structure: Development Size and Shape | Pores and Fissures | Structural Condition | Consistence | Roots Abundance Size and Nature | Calcium Carbonate Content | Mangan Concs etc | Horizon Boundary: Distinctness and Form |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Topsoil | 0-23 | 10YR43 | MCL | 23%>2mm (17%>6cm by weight 6% 2mm - 6cm by displace-ment) | none | - | - | | - | common | | none | abrupt smooth |
| Sub 1 | 23-60+ | 10YR44 | HCL | 63%>2mm (34%>6cm by weight 27%>2mm by displacement) | none | | | | | common | | | abrupt smooth |
| | Pit dug to 60 cm<br>Too difficult to excavate by spade below, Sub 1 continues | | | | | | | | | | | | |

Depth to Slowly Permeable Horizon :- None

Wetness Class :-

Wetness Grade :-

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Available Water Wheat :- 74

Potatoes :-

Moisture Deficit Wheat :- 83

Potatoes :-

Moisture Balance Wheat :- - 9

Potatoes :-

Droughtiness Grade :- 3a (to 80cm)

Final ALC Grade :- 3b

Main Limiting Factor(s) :- Topsoil stones 2-6cm

Remarks :-