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## **BASIS CERTIFICATE IN CROP PROTECTION SYLLABUS & INFORMATION**

The BASIS Certificate in Crop Protection has been established since 1978 to provide training and certification for sellers of agrochemicals and those giving advice on their use.

In 1985 the Food & Environment Protection Act (FEPA) made certification a statutory obligation for pesticide sellers.

"No person shall sell, supply or otherwise market to the end-user a pesticide approved for agricultural use unless he has obtained a certificate of competence recognised by the Ministers, or he sells or supplies that pesticide under the direct supervision of a person who holds such a certificate"

The BASIS certificate in Crop Protection has been approved by Ministers to meet the requirements of Schedule 2 of FEPA for certification for those involved in sale and supply of pesticides.

This booklet is designed to help those involved with training people to meet this standard and provide guidelines to the subject areas which need to be covered to enable them to achieve a satisfactory level of competence.

It is essential that candidates understand the need for a practical approach to training because in order to be successful, individuals must be able to give sound technical advice in the field. Obviously some of the training will be of a theoretical nature but both the syllabus and training programme should be interpreted to provide practical instruction wherever possible.

All staff employed in the field sales of agrochemicals and/or giving advice on their use must, under the Control of Pesticides (Amendment) Regulations 1997, have obtained a Certificate of Competence or exemption from it within three years of entering the Crop Protection industry. New staff to the industry will be allowed a period of three years in which to qualify, during which they will be working under the supervision of a qualified member of staff.

Candidates must have had satisfactory training and supervised field experience before entering for the BASIS examinations. If in doubt as to this requirement, please contact the BASIS office. Candidates who are ill-prepared for the examination obviously represent a waste of time and money to their employer and a waste of time to the examination panel, who give freely of their services. Remember, new entrants to the industry are given up to three years working under supervision before being required to hold the BASIS Certificate in Crop Protection.

Courses are offered for the BASIS Certificate in Crop Protection by the BASIS Approved Trainers listed in this booklet. Courses are run as either day release or in blocks of a week at a time; please contact the trainer of your choice for details.

## **Commercial Floriculture**

The crop disciplines that you will be expected to cover are:

The following cut flower crops both grown under protection or outdoors

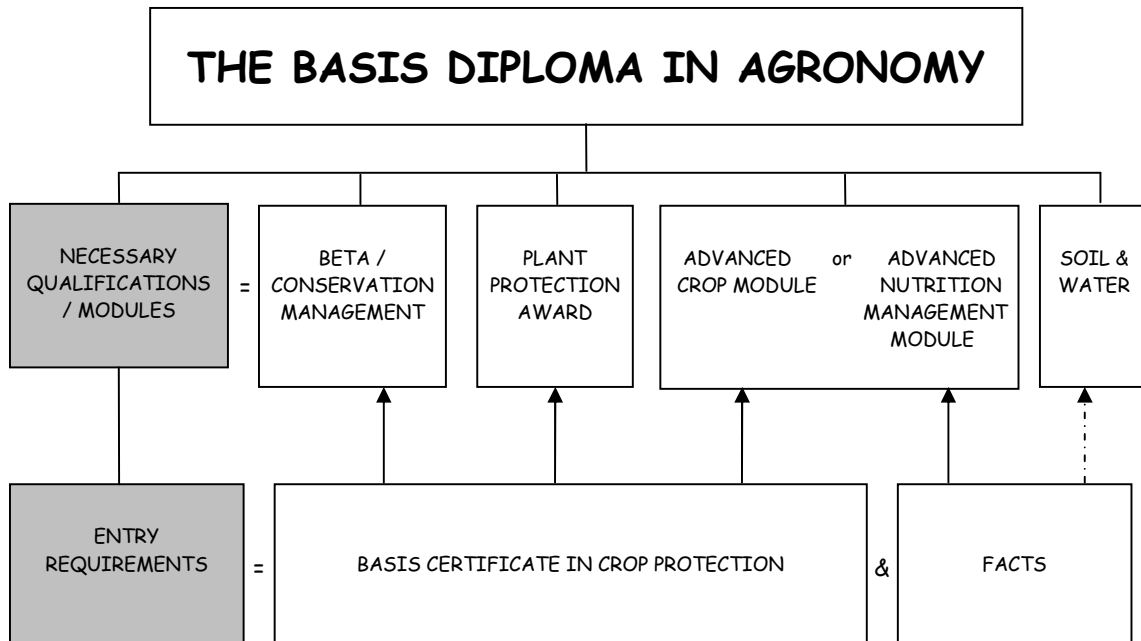
- a. roses
- b. carnations
- c. chrysanthemums
- d. lilies
- e. alstroemeria
- f. flowering pot plants, (poinsettia, chrysanthemum)
- g. narcissus (including bulbs)
- h. tulip

Where the crop type is given these are the ones to concentrate on. Some knowledge of the cultural techniques is advisable. There are a number of other flower types which may be grown and the syllabus does not exclude any which are not specifically listed above. The general principles outlined in this syllabus will apply to all flower crops including those not specifically listed.

The commercial floriculture industry is seen as including cut flowers, flowering pot plants and bedding plants. Growing situations include those under glass, under plastic and other forms of protected cropping as well as outdoor flower production. The above crops will be used as a vehicle on which to put across the basic principles of crop protection.

## THE BASIS DIPLOMA IN AGRONOMY

The breadth and scope of knowledge needed for crop protection sales and advice grows every year. New products, new techniques and the way that crop protection fits with other farm and crop management activities all add to the skills needed by those involved in sales and advice for Crop Protection. To cover the range of factors involved, the new BASIS Diploma in Agronomy, as set out below, gives a comprehensive training and qualification framework for those involved in on-farm advice and sales.



### TOPICS COVERED

<b>ADVANCED CROP MODULE / ADVANCED NUTRITION MANAGEMENT MODULE</b>	Weed, Pest & Disease Control, Crop Protection Programmes, Marketing, Food Industries, Crop Assurance, Nutrient Management
<b>BETA / CONSERVATION MANAGEMENT PLANT PROTECTION AWARD (PPA)</b>	Environment, Biodiversity, EIS's, CPMP's, ICM, Climate Change Systems & Society, Formulation, Mode of Action, Application, Health & Safety
<b>SOIL &amp; WATER</b>	Cultivation Types and Properties, Cropping Systems, Water Quality, Drainage, Pollution/Waste, Plant Nutrition

For the PPA and the Advanced Crop Module the prior achievement (by examination, exemption or validated certificate) of the BASIS Certificate in Crop Protection is an entry requirement. For the Advanced Nutrient Management Module the prior achievement of the FACTS qualification is required.

Prior qualification of the BASIS Certificate in Crop Protection (or exemption or validated certificate) or the Crop Protection Management and / or POWER Certificates are required for the BETA examination. In some circumstances, it may be possible for other types of prior qualification to be taken into account for BETA examination eligibility. BASIS Approved Trainers must be assured that in such cases, the prospective candidate is capable of assimilating the knowledge imparted during the BETA course tuition and also capable of passing the BETA examination.

It is **strongly** recommended that candidates should have had at least two years experience of on-farm practical agronomy before attempting any of the modules which contribute towards the BASIS Diploma in Agronomy, but in particular before taking the Plant Protection Award.

BASIS CPD points are available for training and certification in all modules of the BASIS Diploma.

The accreditation process for our qualifications has enabled BASIS to demonstrate a high standard of training and certification for our BASIS courses. The BASIS Diploma comprises a number of modules and 6 are required to complete the qualification.

A further consequence of accreditation by HAUC and the Higher Education qualifications framework has been the development by HAUC of a Graduate Diploma in Agronomy with Environmental Management.

BASIS courses have all been awarded a number of credits based on the time spent on the course (Targeted Learning Hours). This is a recognised formula including face to face tuition time, research, reading and experiential learning. The credits are awarded at a level that reflects the intensity / difficulty of the learning materials, for example A-level equivalent or 1st, 2nd or final year honours degree etc.

The qualifying BASIS courses with credits and levels awarded are shown below:

<b>FACTS</b>	
<b>Credit Value</b>	15
<b>Level</b>	Intermediate

<b>SOIL &amp; WATER</b>	
<b>Credit Value</b>	15
<b>Level</b>	Honours

<b>BASIS CROP PROTECTION</b>	
<b>Credit Value</b>	30
<b>Level</b>	Honours

<b>BASIS PLANT PROTECTION AWARD</b>	
<b>Credit Value</b>	15
<b>Level</b>	Honours

<b>BASIS ADVANCED MODULES / ADVANCED NUTRIENT MANAGEMENT MODULE</b>	
<b>Credit Value</b>	15
<b>Level</b>	Honours

<b>BETA / CONSERVATION MANAGEMENT</b>	
<b>Credit Value</b>	15
<b>Level</b>	Intermediate

Intermediate = 2<sup>nd</sup> or 3<sup>rd</sup> year of university degree qualification.

Honours level - final year university degree.

Eg. FACTS 15 credits = 150 hours notional teaching time

The six modules required for the BASIS Diploma add up to 105 credits. In order to qualify for the HAUC Graduate Diploma in Agronomy with Environmental Management, candidates will need to accumulate 120 credits (ie one extra 15 credit module in addition to the BASIS Diploma). This can be any of the Advanced Crop Modules or the new Nutrient Management Planning qualification, available from September 2009.

Further details of the BASIS Diploma in Agronomy can be obtained from the BASIS office or by e-mail to [sue@basis-reg.co.uk](mailto:sue@basis-reg.co.uk) or [steph@basis-reg.co.uk](mailto:steph@basis-reg.co.uk) or [amanda@basis-reg.co.uk](mailto:amanda@basis-reg.co.uk)

## EXAMINATION GUIDELINES

### Introduction

Examinations are held by Training Providers who have been running training courses for the BASIS Certificate in Crop Protection in various parts of the UK. The examination is divided into four sections, all of which must be passed. They are:

- a) multi-choice question paper
- b) practical identification test
- c) project
- d) field station and panel vivas

### Overall Standard for Examination

The BASIS certificate was originally aimed at pesticide salesmen and advisers within the distributor/manufacturer trade, and independent advisers. However, since the inception of the various assurance schemes, there has been an upsurge of interest from farmers, growers and other organisations to obtain the BASIS qualification.

The overall aim of the examination is to determine whether candidates have understood the basic principles relating to pesticides, detailed within the BASIS syllabus. Candidates who successfully pass the BASIS Certificate in Crop Protection cannot necessarily classify themselves as "experienced" advisers; this will depend on the individual's experience or will come with time within the industry. The examination panel must be sure of candidates' ability, not only to grasp the basic principles of Crop Protection, but also that they are considered to give safe recommendations and understand the environmental issues involved, along with relevant current legislation. If candidates have not been working with a particular crop this should not rule against them in an examination, but they should know their limitations as far as the advice which can be given and, from there, where to seek further relevant advice. Obviously candidates need to be competent with the crops for which they have responsibility, or have had previous experience.

## THE EXAM

### Multi-Choice Question Paper

Questions for the paper have been submitted by the industry and are validated by a Technical Panel. The paper consists of 70 multi-choice questions to be completed within two hours. Four answers are given for each question and in each case only one is correct. Candidates are examined on all eight modules of the BASIS syllabus, including ICM.

Pass mark for this section - 70%

### Practical Identification Test

Candidates are required to identify common weeds, pests and diseases either in an examination room or a laboratory.

Pass mark for this section - 85%

### Project

Candidates are required to present a project, guidelines for which are given on pages 10 - 13. The project must be sent to the examination centre at least six weeks prior to the examination. The aim of the project is not to produce an academic thesis but a document which will be of practical use to the candidate in his/her future work with pesticides within the flower industry.

Pass mark for this section - 60%

### Field Station and Panel Viva

#### a) Field Station Viva

All candidates are expected to have practical knowledge of recommendations, application, storage and legislation appropriate to pesticides and Integrated Crop Management as outlined in the modules within the BASIS syllabus. All candidates will be tested by representatives of the industry in the field situation. Books and back-up materials are not required but candidates should be able to tell the examiner where they would seek the necessary information should the need arise.

There will usually be two 'crop' vivas and a pesticide store.

Marks from all 3 'Field Stations' are taken into account when assessing a candidate's ability.

## b) Viva Panel

The final section of the examination involves candidates meeting a panel of people from the pesticide industry, some or all of whom they will have met in the practical 'Field Stations'. The purpose of this section is to enable the panel to make a final assessment of the candidate as a competent adviser for pesticides used in crop protection in the flower industry. All the candidate's marks from the three previous sections are available to the panel. The interview is carried out in an informal and friendly atmosphere.

Pass mark for this section - 85%

NB - Companies are reminded that candidates must have had satisfactory training and supervised field experience before entering for the BASIS examination. If in doubt as to this requirement, please contact the BASIS office.

### **General Notes**

It is essential that candidates acquire sufficient practical experience with the full range of crops applicable to the examination. Examiners must be assured that the candidate is capable of giving clear, concise and accurate recommendations.

Theoretical knowledge without an understanding of its practical application would not be sufficient for a candidate to pass the exam.

# BASIS GUIDELINES FOR FSTS CROP PROTECTION PROJECT

## Content

The project **MUST** have significant crop protection content and incorporate **clear reference to a practical situation** known to the candidate, showing actual personal practical involvement with the data generated. A literature review alone is **not appropriate**.

**Appropriate reference should be made to the environmental aspects of using pesticides and to environmental safeguards.**

Surveys of agricultural practice are acceptable but should include personal on-farm/in-field information gathering or verification, i.e. the raw data from survey, average crop yields, quality achieved etc.

## Examples of types of project studies

- Biology and integrated control of a particular weed, pest or disease on a farm or holding e.g. Red Spider Mite, Thrips, Lily Mosaic Virus
- Aspects of crop protection within a crop e.g. Phytoseiulus control of Red Spider in Roses
- Crop storage e.g. Narcissus bulbs
- Pesticide handling and pesticide application (relating to a real-life situation) e.g. Use of pesticides near water, effects of water volume and forward speed on efficacy, storage of pesticides, selection of an appropriate pesticide applicator.
- Evaluation and use in commercial practice of a new pesticide or new use of a pesticide.
- Use of conservation headlands as part of an integrated control strategy (on a given farm).
- Pest/Disease resistance to individual or groups of pesticides.

The above are suggestions only; there are many others that candidates may choose.

## Structure

Executive Summary	Main points identified - bullet points
Introduction	Background to the project
Aims	Statement of the aims
Report	The main body of the project, this should include: - technical information relevant to the topic including references - details of field observations/trials etc.
Conclusion	Interpretation of the report findings
References & Appendix	List of the sources used  <i>eg. Information references / sources</i> <i>Gill &amp; Vear - Agricultural Botany</i> <i>CPA - Avoidance of Water Contamination</i> <i>BCPC - The UK Pesticide Guide 2005</i> <i>etc.</i>

Full use should be made of relevant photographs, diagrams, illustrations etc.

As a guide the project should be at least 3000 words in length, but not more than 5000. (i.e. probably 10-15 sides of A4)

The project should be all the candidate's own work. Any trials, results or data not collected by the author should be clearly credited.

It is expected that the project will be typed. Please note that projects will probably be returned after they have been marked, but BASIS reserves the right to retain some projects for reference, external verification and modulation as required.

Completion date at least 6 weeks before the exam with copy to the tutor. (If there is close communication between the tutor and candidate the interval between submission and exam can be reduced).

Pass mark - 60%

Candidates who do not complete a project (and consequently no project mark is available to examiners) will not be able to sit the multi-choice exam paper. A copy of the marking sheet for each project will be kept by BASIS (Registration) Ltd.

## PROJECT MARKING SCHEME

1.	Problem clearly identified	2 points
	Relevant information found	2 points
	Difficulty of project	3 points
	Key concepts	
	Independent thought	
	Information sorted and prioritised	1 point
	Commercial information included	1 point
	Academic information included	
	<u>Total mark (out of 9)</u>	

2.	<u>Technical Content</u>	
	Accuracy (and appropriateness)	2 points
	<u>eg</u> Life cycles where appropriate or sprayer technology / nozzles	
	1. Explained fully	5 points
	2. Diagrammatical representation / photos / drawings	2 points
	Environmental / cultural influences	2 points
	Relevance to project	2 points
	<u>Total mark (out of 13)</u>	

3.	Legal accuracy	1 point
	Environmental considerations	2 points
	Relevant legislation / regulations explained	2 points
	Chemical / environmental information correct	2 points
	Environmental implications identified and explained	2 points
	<u>Total mark (out of 9)</u>	

4.	<u>Introduction</u>	Problem clearly identified	1 point
	<u>Executive Summary</u>	How much individual work is involved?	5 points
	<u>Report</u>	Include 1., 2. & 3. Also: What individual data is included?	50 points

		How was it collected?	
		What value has it for the project?	
		What conclusions can be drawn?	
		How will it help future work?	
		What has been learned?	
		Diagrams, graphs and pictures	
	<u>Conclusion</u>		5 points
	<u>References &amp; Appendix</u>		3 points

5.	Clear / understandable	5 points
	Logical flow of thought	
	Appropriate use of diagrams / graphs / pictures	

Comments (Strengths and Weaknesses)	Total Mark (out of 100) .....

## YOUR QUESTIONS ANSWERED

- **DO I NEED TO TAKE A TRAINING COURSE IN ORDER TO SIT THE BASIS EXAMINATION?**

Not necessarily, if you feel you already have enough technical knowledge and in-field experience. However, candidates should ensure that they have been trained satisfactorily, either in-house or externally, and have had sufficient supervised field experience prior to the examination, so that they are capable of giving clear, concise recommendations for the use of crop protection products.

- **WHAT FORM DO THE TRAINING COURSES TAKE?**

That will depend on the trainer / training provider, the chosen course and on previous experience to date. Courses can run for up to a total of 15 days. This will be split up into blocks of a week at a time or perhaps day release.

- **WHERE ARE TRAINING COURSES HELD?**

Details of trainers and locality can be found listed on page 45.

- **HOW DO I APPLY TO TAKE A TRAINING COURSE?**

Contact the Training Provider of your choice and complete a training course application form. Send your application to your chosen training provider.

- **IS IT POSSIBLE TO OBTAIN THE QUALIFICATION THROUGH CORRESPONDENCE OR EVENING CLASSES?**

A distance learning course is available for overseas candidates though not at the moment for those in the UK.

- **WHEN AND WHERE ARE EXAMINATIONS HELD?**

Examinations are held when there are sufficient numbers to make them viable, usually following a training course and at a venue chosen by the training provider.

- **WHAT DOES THE EXAMINATION ENTAIL?**

Details can be found in this booklet on pages 8 - 10.

- **IF I FAIL THE EXAMINATION, CAN I RE-SIT?**

Yes you can re-sit the exam; however, BASIS examinations are accredited on the Higher Education qualifications framework. One consequence of this is that we need to ensure procedures are in place to improve candidates' chances of success in subsequent examinations following a previous failure.

Where candidates have been examined unsuccessfully on two occasions, they will be required to retrain before attempting the exam for a third time.

Candidates and trainers will be required to complete a form to confirm that they have retrained, particularly covering areas that were identified as 'areas of weakness' at previous exams.

The form should be presented to the exam Chairman at the third exam attempt. Failure to confirm that retraining has taken place will result in a refusal to conduct the viva examination and subsequent 'no result' for the exam.

Please help us to help you by asking your training provider to evaluate your training needs and undertake the training required to ensure you can pass the exam.

Those candidates wishing to go forward for the 'BASIS Diploma and later the HAUC Diploma in Agronomy with Environmental Management should be aware that only four attempts at any examination will be permitted if that course is included as a qualification module for the diploma(s).

- **WHAT IF I FAIL ONE PART OF THE EXAMINATION BUT PASS THE OTHER?**

If you fail the project but pass everything else you will only have to re-submit the project. However, if you fail any part of the written, practical or Field & Panel vivas, you must re-sit all parts of the exam again.

- **IF I APPLY FOR A JOB WITHIN THE PESTICIDES INDUSTRY DO I HAVE TO HOLD THE BASIS CERTIFICATE OR HAVE EXEMPTION FROM IT?**

If you have not previously been employed by a distributor you have up to three years from entering the industry in which to become qualified. During that time you must work under the supervision of a certificate holder. Anyone involved in the sale or supply of pesticides must hold the BASIS Certificate of Competence.

- **WHAT IS MEANT BY "WORKING UNDER SUPERVISION"?**

All good trading companies will require their new personnel to have an initial period of training, accompanied by a qualified member of their staff. There will come a time when the company will have to allow the representative to work on his own. Until such time that he/she becomes qualified, all advice given and sales made by the new representative must be monitored by a qualified person who should countersign their sales documentation.

- **HOW DO I APPLY TO SIT THE BASIS EXAMINATION?**

Complete an examination application form and return it to the Training Provider of your choice. You will be notified when an examination is to take place. (Those attending a BASIS training course will automatically be entered for the examination and so do not need to apply separately).

- **WHEN WILL I RECEIVE MY EXAMINATION RESULTS?**

We aim to issue results and feedback within 4 weeks from the date of examination. **Please note results will not be given over the telephone.**

## OBJECTIVE SYLLABUS

The syllabus has been designed to allow individual sections of training to be treated as separate units for training purposes. This will permit the choice of the most appropriate time of year in which to undertake such training. Some indication of time required to cover each section of the syllabus is given in the introduction to that section. Those concerned with the training will thus be able to assess the depth of treatment for each subject and establish their training programme accordingly.

### MODULE 1 (a) - INTEGRATED CROP MANAGEMENT

#### 1(a).1 Competence

Ensure a knowledge and understanding of the concept and importance of Integrated Crop Management (ICM) and Integrated Farming Systems (IFS) and a knowledge of their practical application in UK Farming Systems.

#### 1(a).2 Performance Criteria

Candidates must be able to:

- define ICM.
- understand the importance of ICM.
- identify the components of ICM.
- describe the role of key organisations involved in developing and promoting ICM.
- provide an understanding of the way in which site factors influence cropping and crop management.
- to demonstrate a knowledge of all factors involved in rotation decisions and in variety choice.
- provide an understanding of the importance of soil management and a sound approach to crop nutrition in integrated crop management.
- develop an appreciation of the practice and importance of farm wildlife and landscape management.

- understand the role of monitoring, auditing and management techniques in ICM.
- improve the role of ICM in providing safe produce and food ingredients of quality.
- develop an understanding of the importance and practice of efficient energy use in the farm business.
- ensure an understanding that waste materials can be a resource that requires planned management if they are not to become environmentally damaging, economically costly and aesthetically undesirable.

### **1(a).3 Essential Knowledge & Skills**

Candidates must have the ability to:

- understand how site factors affect cropping and crop management decisions and is an essential part of creating an ICM plan.
- recognise the major factors influencing choice of cropping system and rotation.
- use all appropriate criteria to select suitable crop varieties.
- recognise how a knowledge of soil texture informs decisions in ICM.
- understand the principles of economic and environmentally acceptable management of crop nutrition.
- explain the importance of soil structure to crop development and crop management.
- understand the aim and benefits of a planned wildlife and landscape management policy.
- identify the wildlife and landscape features on farms.
- describe practical steps concerning these features which should form part of an ICM plan.
- define and explain the importance of both monitoring and auditing.
- identify parameters which would be useful to monitor.
- outline how an ICM programme could be successfully managed.

- explain the importance of producing safe produce which meets quality specifications.
- outline key aspects of an ICM approach which contributes to this.
- explain the roles of protocols, assurance schemes and legislation in achieving food safety.
- outline the aims of a planned strategy for management of energy.
- identify points of energy consumption.
- outline practical steps to ensure energy efficiency.
- explain the principles of waste management.
- identify specific farm wastes which represent particular hazards, and explain measures required for their management.
- outline how a farm waste management plan should be made.

## **MODULE 1 (b) - GROWTH AND DEVELOPMENT OF CROPS AND COMMERCIAL PRODUCTION**

### **1(b).1 Competence**

Develop an ability to understand plant growth and development in flower crops and bulbs.

### **1(b).2 Performance Criteria**

Candidates must be able to:

- explain the process of plant growth and development.
- recognise major factors affecting the growth of crop plants, including the use of plant growth regulators.

### **1(b).3 Essential Knowledge & Skills**

Candidates must have the ability to:

- identify limiting factors to high yields.
- be aware of practices and inputs for maximising yield and quality.
- understand the effect of climate both under protection and outdoors on plant growth.
- understand the post-harvest management of cut flowers and flower bulbs.

## **MODULE 2 - RECOGNITION AND CAUSES OF CROP DISORDERS**

### **2.1 Competence**

Develop an ability to discriminate between crop damage directly induced by environmental factors, damage caused by pests and pathogens and possible methods which may be adopted for prevention or control.

### **2.2 Performance Criteria**

Candidates must be able to:

- provide a basis for the description and possible identification of damage due to disorders.
- provide a basis for damage evaluation.
- outline methods available for preventing and limiting particular crop disorders, and the appropriate selection of corrective treatments.
- provide a knowledge of the susceptibility of particular crops to certain disorders, and an understanding of procedures suitable for their treatment.

### **2.3 Essential Knowledge & Skills**

Candidates must have the ability to:

- describe symptoms of unsatisfactory growth.
- recognise crop damage induced by adverse physical soil conditions.
- recognise crop damage caused by unsuitable pH status, nutrient imbalance, nutrient deficiencies and the misuse of crop protection materials.
- recognise crop damage caused by an adverse soil moisture.
- recognise crop damage induced by extreme weather factors.
- develop an awareness of types of plant damage caused by pollutants from the atmosphere, soil and irrigation water.

- determine the likely duration of the stress in current and future crops.
- compare and contrast environmental damage with the types which may be caused by pests and pathogens of crops.
- be aware of the procedures necessary for the notification and confirmation of possible causes by specialists.
- relate crop growth and development to equivalent stages in unaffected, potentially high yielding crops.
- estimate the extent of current and future crop damage.
- explain the possible causes and cures of particular problems.
- identify alternative crops and varieties which are less susceptible to particular disorders.
- identify practices and materials for the rectification of pH and nutrient problems.
- identify procedures for optimising soil moisture status.
- identify cultural practices that might alleviate particular disorders.
- examine uneven crops for symptoms of damage and poor growth.
- identify specific instances where damage and poor growth is not attributable to pests and disease, or weed competition.
- examine particular soils for evidence of compaction, inadequate drainage or moisture stress.
- interpret the results of chemical analysis of particular plants and soil samples.
- relate types of topography and crop structure to damage likely from wind, hail, frost and snow.
- relate specific symptoms to past or present conditions of the physical and chemical nature of soil, irrigation of water or adverse atmospheric factors.
- make decisions on measures to correct abnormal crop growth and prevent its recurrence.

## **MODULE 3 - RECOGNITION, BIOLOGY AND CONTROL OF WEEDS**

### **3.1 Competence**

Develop an ability for accurate weed identification and the evaluation of safe and appropriate control measures.

### **3.2 Performance Criteria**

Candidates must be able to:

- provide a basis for accurate weed identification
- develop an understanding of weed biology.
- provide an appreciation of the reasons for weed control, and their evaluation.
- provide a knowledge and understanding of methods available for weed prevention and control.
- develop a knowledge of major weed problems of particular crops and develop an understanding of the choice and integration of suitable and economical control treatments.

### **3.3 Essential Knowledge & Skills**

Candidates must have the ability to:

- understand the causes of weed infestation in crops and the vital importance of clean crop seeds.
- describe the main features of seed morphology and physiology that contribute to the dissemination and successful establishment of weed species.
- understand the dynamics of the weed seed population of soils and especially of the factors that encourage a reduction in seed numbers.
- understand the importance of vegetative regeneration of weeds in relation to cultivation, cropping practices and weed control.
- interpret the seasonal and locational appearance of major weed species.

- recognise major weeds according to region in specific crops.
- examine and assess weed problems in particular crops and maintain records of infestation.
- select and justify appropriate control measures.
- recognise which herbicides will reduce weed populations and which combinations of herbicides can be legally and safely applied as tank mixes for specific problems.
- calculate suitable dose rates and justify the timing and methods of application for specific weed problems.
- predict the weed control strategies for particular fields which are necessary to reduce weed populations progressively.
- explain the interaction between husbandry practices, soil type and weed incidence in particular crops, or on particular farms.
- identify and name botanical features used for recognition of seeds, seedlings and mature plants.
- recognise different stages of plant growth.
- use an identification key successfully.
- recognise major weed species associated with particular regional cropping practices and soil types.
- describe the nature of weed competition and predict the likely outcome of the level of weed infestation.
- understand the significance of particular weed and volunteer crop plant species as hosts of pests and pathogens.
- recognise poisonous and tainting weeds.
- explain the possible problems caused by particular weed species to mechanical operations in the field.
- describe the possible contamination of crops at harvest by weeds.
- demonstrate an awareness of legislation relating to noxious weeds and weed seeds.

- explain the significance of particular cultural practices to the prevention, reduction and control of weed problems.
- recognise the competitive abilities of cultivated plants in various cropping systems.
- classify the main types of chemical control measures and major groups of chemical materials.
- justify the choice of methods for the control of particular types of weed species and weed infestations.

## MODULE 4 - RECOGNITION, BIOLOGY AND CONTROL OF PESTS

### 4.1 Competence

- Develop the ability to recognise pests and pest damage, to anticipate and prevent pest problems and to choose safe and appropriate control measures.

### 4.2 Performance Criteria

Candidates will be able to:

- develop a knowledge of feeding methods and behaviour which will provide a basis for diagnosis of the causes of pest damage symptoms.
- develop an awareness of the factors that determine the occurrence of pest damage and its importance.
- develop a knowledge and understanding of the methods available to prevent or control pest damage.
- develop the ability to recognise the important pests of specific crops, to identify, anticipate and prevent the damage each may cause, and to select the most appropriate control measures or combination of measures for specific circumstances.
- Develop a knowledge of the characteristics and life cycles of those groups of animals that include important pest species.

### 4.3 Essential Knowledge & Skills

Candidates must have the ability to:

- describe the structures used in feeding by eelworms, slugs, mites and insects.
- explain the method of feeding of pest species from these groups.
- relate pest feeding to typical damage symptoms to roots, shoots, leaves, flower, seeds and fruit.
- relate pest feeding to the transmission of crop pathogens.

- diagnose the causes of crop damage by identifying symptoms and/or pests.
- relate pest incidence to particular cropping practices.
- relate pest incidence to pest mobility, host specificity, weather and climate.
- apply knowledge of the factors affecting pest incidence to the monitoring of pest species and the prediction and prevention of pest damage.
- identify legislation designed to minimise the importation, dissemination and multiplication of crop pests.
- select cultural practices that may be used to minimise pest damage.
- identify crop varieties resistant to pests and the circumstances in which they should be used.
- identify biological agents that are used in commercial practice to control crop pests and appropriate circumstances for their use.
- choose appropriate chemical control measures for particular pest problems in the field and store.
- explain the advantages of integrating pest control methods by reference to specific examples.
- recognise eelworms, slugs, millipedes, mites and the important orders of insects.
- describe typical life cycles of eelworms.
- describe typical life cycles of mites, millipedes and insects.
- describe the cycle of generations of aphids.
- identify the special features of bird and mammal biology that contribute to pest problems caused by these animals.
- identify the major pests or pest damage symptoms, as appropriate, according to region in specific crops.
- evaluate the risk of damage or describe the steps that must be taken to get such risks evaluated by specialist services.

- recommend and justify specific control measures.
- calculate appropriate dose rates for particular pesticides, and justify the timing and methods of application for specific pest problems.
- design pest control strategies for specific cropping sequences.

## **MODULE 5 - RECOGNITION, BIOLOGY AND CONTROL OF DISEASES**

### **5.1 Competence**

Develop an ability for the recognition of disease symptoms, the evaluation of disease problems and choice of appropriate control measures.

### **5.2 Performance Criteria**

Candidates will be able to:

- provide a basis for accurate disease identification.
- explain the significance of disease-damage and provide a knowledge of the methods of assessment and evaluation.
- provide an understanding of the biology of major causal agents of disease.
- demonstrate an understanding of methods available for disease control, reduction and prevention.
- provide knowledge of the major diseases of specific crops and an understanding of the choice and integration of suitable control measures.

### **5.3 Essential Knowledge & Skills**

Candidates must have the ability to:

- recognise the nature of major types of plant damage.
- interpret the significance of types of damage to crop growth and storage.
- carry out disease assessments on plants.
- assess and record disease damage within crops.
- evaluate the economic significance of disease damage.
- describe significant characteristics of virus, mycoplasma, bacterial and fungal pathogens.

- relate conditions influencing the survival, build-up and dispersal of pathogens to disease development.
- recognise environmental influences on infection and the development of disease within crops.
- use a knowledge of the factors influencing infection and disease development to forecasting and the prediction of disease risks.
- develop an understanding of major legislation relating to plant disease.
- recognise the significance of particular cultural practices to disease control.
- identify varieties of crop plants resistant to diseases.
- recognise the availability of physical and chemical control measures.
- classify the main types of chemical control measures, and major groups of chemicals.
- justify the choice of methods for the control of particular types of diseases.
- develop an awareness of the methods of producing disease-free vegetatively propagated material by heat treatment, tip culture, or growing in isolation and the role of certification and nuclear stock schemes.
- recognise major diseases in particular crops according to region.
- evaluate disease risks to particular crops.
- carry out examinations of crops and compile crop records.
- select and justify appropriate control measures.
- calculate appropriate dose rates for particular fungicides, and justify the timing and methods of application for specific disease problems.
- understand and explain disease control strategies for future cropping programmes.
- identify the main types of visible changes to plants and plant produce caused by virus, mycoplasma, bacterial and fungal infection.
- recognise the development of symptoms at different stages of crop growth and storage.

- recognise major varietal effects, and the influence of growing and storage condition, on symptom expression.
- interpret the distribution pattern of symptom development within a crop,

## **MODULE 6 - COMPOSITION, ACTIVITY AND PERSISTENCE OF CROP PROTECTION CHEMICALS, AND BIOLOGICAL AGENTS**

### **6.1 Competence**

To develop an understanding of the nature of crop protection chemicals and biological control agents.

### **6.2 Performance Criteria**

Candidates will be able to:

- ensure the correct use of technical terms.
- understand the composition of crop protection materials.
- develop an awareness of the use of biological control agents.
- elucidate the biological activity of important groups of chemicals.
- provide an understanding of factors influencing persistence.
- provide an understanding of the development of tolerance to certain crop protection materials by target organisms.

### **6.3 Essential Knowledge & Skills**

Candidates must have the ability to:

- explain the use of chemical names, BSI approved common names and proprietary names for crop protection materials.
- classify crop protection materials into functional, chemical and mode of action categories.
- accurately define terms used in relation to chemical and crop treatments.
- identify formulations in the form of emulsifiable concentrates, wettable powders, suspension concentrates, dusts, granules, fumigant materials, combustible materials, aerosols and encapsulated materials.

- understand the basic functions of additives, such as surfactants, dilutants and dispersing, dispensing and emulsifying agents.
- explain the significance and limitations of different formulations in relation to application, activity, selectivity, toxicology, persistence and environmental effects.
- explain the importance of compliance with manufacturers' instructions for correct dosages and the application of particular formulations.
- describe the characteristics of biological control agents.
- compile a list of potential biological control agents, and discuss examples of successful commercial exploitation.
- outline the benefits and practical limitations of biological control.
- outline the mode of action of major groups of herbicides, nematocides, molluscicides, acaricides, insecticides, vertebrate poisons, fungicides and plant growth regulators.
- develop a knowledge of certain properties of materials which influence their biological activity, selectivity and human toxicity.
- describe the likely influence of weather factors on the effectiveness and behaviour of particular materials.
- describe the influences of soil type on the behaviour of crop protection materials.
- identify types and significant properties of soils.
- explain the importance of recognising the correct stages of development of crops, weeds, pests and diseases, in relation to crop safety and maximising the effectiveness of treatments.
- recognise the susceptibility of particular varieties of crop plants to phytotoxic damage by certain materials.
- explain the limitations of particular materials.
- explain likely causes of crop damage by chemical treatments.
- understand the importance of storage conditions on the activity of particular materials.

- explain the possible reasons for the ineffectiveness of chemical treatments in particular situations and seasons.
- give justification for the selection of certain materials for particular situations.
- apply knowledge of factors influencing the behaviour of particular crop protection materials to their possible persistence in the environment and plant produce.
- recognise the significance of approved and recommended uses of particular materials in relation to persistence.
- recognise the significance of minimum time intervals between the last application timing of particular materials and the harvest of edible crops.
- develop a knowledge of sampling procedures and the preparation of material for residue analysis by specialists.
- develop a knowledge of tolerance in target organisms to particular crop protection chemicals.
- outline how tolerance in target organisms develops.
- explain measures for limiting the development of tolerance.
- recommend alternative materials in situations where tolerance exists, or is likely to develop.
- detail alternative strategies of control to overcome problems of tolerance, and prevent its possible development in target organisms.

## **MODULE 7 - APPLICATION OF CROP PROTECTION CHEMICALS**

### **7.1 Competence**

To develop an understanding of the equipment and techniques for applying crop protection materials.

### **7.2 Performance Criteria**

Candidates will be able to:

- develop an awareness of formulations in relation to application treatments.
- provide a knowledge of the types, and use, of equipment for spray application.
- provide a knowledge of correct sprayer use and maintenance and accurate application procedures.
- provide an appreciation of the aerial application of crop protection materials.
- develop an appreciation of potential hazards associated with application and encourage safety consciousness.

### **7.3 Essential Knowledge & Skills**

Candidates must have the ability to:

- develop a knowledge of the various types of formulations of crop protection materials.
- recognise the significance of formulation in relation to the choice of application equipment, and method of delivery of the material.
- describe the practical limits of the accuracy of placement of particular materials.
- give details of types of application treatment.
- describe vehicles utilised for the application of crop protection materials.

- recognise the nature of plant surfaces and their influence on the degree of retention and distribution of chemicals.
- explain the importance of factors such as droplet size, wetters and oil additives to the retention and distribution of chemicals on plant surfaces.
- develop a knowledge of the various types of spray application equipment, including specialised soil injection, seed treatment, granule and dust applicators and fumigation equipment.
- develop a knowledge of the hydraulic circuitry of sprayers, including ON/OFF systems, agitators, anti-drip devices, filters, positions and types of valves, filling systems and types of pumps.
- identify and describe types of nozzles.
- describe equipment for ultra-low volume, and controlled-droplet application.
- understand the interaction of factors such as pressure, nozzle size and type and tractor speed on droplet size and coverage.
- identify major faults.
- calibrate tractor sprayers.
- understand maintenance of tractor spray equipment.
- describe, calibrate and maintain hand-operated equipment.
- outline procedures for ensuring correct spray output.
- explain the significance of bout-marking devices, and boom height and stability for accurate spray placement.
- describe methods of improving the accuracy of spray application.
- recognise symptoms in crops of incorrect spray application.
- recognise the types of materials approved for aerial application.
- recognise the specialist nature of aerial application.
- identify potential hazards in maintaining application equipment.

- describe safe procedures for the handling of materials and their preparation for application.
- describe procedures for ensuring the safety of operators during the application of crop protection materials.
- recognise safe procedures for protecting the general public and environment from potential hazards during the application of crop protection materials.

## MODULE 8 - SAFE USE, HANDLING, TRANSPORT AND STORAGE OF CROP PROTECTION CHEMICALS

### 8.1 Competence

Develop an appreciation of the hazards of crop protection chemicals, to encourage safety consciousness and an awareness of legal obligations.

### 8.2 Performance Criteria

Candidates will be able to:

- ensure a thorough understanding of the human hazards presented by pesticides and the circumstances in which poisoning may occur.
- develop an awareness of the harmful effects of pesticides on the environment and encourage a willingness to minimise such effects.
- develop an understanding of possible harmful effects of pesticides on crops through direct toxicity, the destruction of pest enemies or the development of pesticide resistance.
- understand the obligations and requirements of pesticide legislation and registration schemes.
- encourage an awareness of the importance of safe practices and a knowledge of the procedures and precautions that should be adopted.

### 8.3 Essential Knowledge & Skills

Candidates must have the ability to:

- identify the routes of entry of pesticides into the human body.
- define the terms oral toxicity, dermal toxicity and LD50.
- identify, from a list of common crop protection chemicals, those which are most toxic to man.

- identify the application procedures and formulations likely to give rise to the greatest contamination of operatives clothing, skin and respiratory tract.
- recognise the influence of previous exposure on the toxicity of anti-cholinesterase compounds.
- recognise the hazards associated with uncontrolled access to crop protection operations, materials and stores, especially by children and domestic animals.
- give an explanation of the hazards associated with the transfer of pesticides into incorrectly labelled containers.
- define the terms food chain, food web and ecosystem.
- identify important wildlife refuges in agricultural areas.
- explain the possible effects of pesticides on soil animals and micro-organisms.
- show how herbicides may affect the population density of wild plants, animals and game birds.
- explain how insecticides may affect the population density of wild animals and game through direct toxicity and food chain effects.
- explain how pesticides may cause pollution of water and damage to aquatic organisms.
- describe the circumstances in which insect pollinators may be killed by pesticides.
- illustrate, with examples, the toxicity of pesticides to crop species and varieties.
- explain how crops may be damaged by approved products through incorrect application, dose rates and pesticide mixtures.
- show how pesticides may come in contact with crops not deliberately treated with them.
- explain the circumstances in which pesticide use can lead to increased pest incidence.
- account for the development of resistance to insecticides and fungicides.

- identify the major obligations of employers, employees and the self employed under:
  - a) the Control of Substances Hazardous to Health Regulations (COSHH)
  - b) the Health and Safety at Work Act, 1974
  - c) Poisons Act 1972 - Poisons List Order 1982 and the Poison Rules 1982
  - d) Water Resources Act 1991
  - e) the Control of Pollution Act, 1974
  - f) Ground Water Regulations 1998
  
- identify the major provisions and obligations of:
  - a) the Food and Environment Protection Act 1985
  - b) Control of Pesticides (Amendment) Regulations 1997
  - c) BASIS (Registration) Limited
  - d) the Local Environmental Risk Assessment for Pesticides (LERAP) arrangements
  
- explain the importance of appropriate choice of chemicals, mixtures, formulations and methods of application in reducing risks to people, the environment and the crop.
- describe the precautions to be taken during the transport of pesticides.
- describe safe specifications for a pesticide store on a farm or holding.
- emphasise the importance of limiting access to crop protection stores, and operations.
- relate the regulations for protective clothing requirement to choice of chemical formulation, method of application and the environment in which application will take place.
- demonstrate the safety precautions taken during the mixing of pesticides and filling application equipment.
- describe working practices that will minimise contamination of the operatives and minimise drift.
- describe safe methods of disposal of unwanted pesticides, protective clothing and empty containers.
- describe decontamination procedures for clothing and skin.
- understand the relationship between the interval before harvest, the access of people and livestock to treated areas, and the risks associated with chemicals of varying persistence and toxicity.

- describe the steps that should be taken if human poisoning is suspected.
- understand the legal obligations concerning consumers under the Food Safety Act 1990.
- understand the legal obligations concerning the environment.

## FSTS - INCORPORATING ICM

### SAMPLE MULTI-CHOICE QUESTIONS FOR THE FSTS EXAMINATION

The following sample questions give a guideline of the type and presentation of questions candidates will have to answer when taking the FSTS examination. They are purely intended as a guide and consist of superseded questions from actual past papers. The multi-choice question paper consists of 70 questions including 10 ICM questions and covers all the areas listed in the attached syllabus.

1. Soil texture refers to
  - a) the relative proportions of sand, silt and clay
  - b) the aggregation of soil particles
  - c) the porosity of the soil
  - d) the depth of the soil
  
2. A high soil pH may result in
  - a) phosphate leaching
  - b) nitrate leaching
  - c) minor nutrient toxicity
  - d) minor nutrient deficiency
  
3. Biological control involves the use of
  - a) resistant varieties
  - b) predators
  - c) cultivations
  - d) rotations
  
4. Pesticides on the Red List are a particular danger to
  - a) sprayer operators
  - b) natural predators
  - c) the aquatic environment
  - d) neighbouring crops

5. The organisation responsible for approval of pesticides in the UK is the
- a) Crop Protection Association
  - b) Pesticide Safety Directorate
  - c) Pesticide Forum
  - d) Environment Agency
6. Spring crops should be included in rotations to
- a) provide ground nesting sites for farmland birds
  - b) reduce nitrate leaching
  - c) increase soil organic matter
  - d) prevent soil erosion
7. Demeton S Methyl is an insecticide belonging to the
- a) carbamate group
  - b) organochlorine group
  - c) organophosphorus group
  - d) pyrethroid group
8. Which of the following active ingredients is scheduled as a poison (Poisons Act, 1972)?
- a) gamma HCH
  - b) benazolin
  - c) permethrin
  - d) aldicarb
9. The fungicide with a different mode of action against powdery mildew to the other three is
- a) triadimenol (e.g. Bayfidan)
  - b) propiconazole (e.g. Tilt 250 EC)
  - c) tridemorph (e.g. Calixin)
  - d) flutriafol (e.g. Pointer)

## BASIS APPROVED TRAINERS

The following Colleges, Trainers and Training Providers are successfully running Floriculture examinations and have been accepted as BASIS Approved Trainers for Floriculture.

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The following Colleges, Trainers and Training Organisations have expressed an interest in running some, or all, of the training modules and / or the Floriculture examination.