

# Test Bank for Qualification Examination

## Pest Management

1. How to management an organic farm?
2. What is the microbial control? There are include which control agents?
3. Please set up a control procedure for mosquitoes suitable for Taiwan situation.
4. What is integrated pest management? How many tactics can be involved and how to integrate to form an IPM strategy, please give fall army-worm as example to explain?
5. 請依照殺蟲劑抗藥性行動委員會(Insecticide Resistance Action Committee)的歸納方式說明殺蟲劑可分為哪幾大類？每一大類的殺蟲劑又涵蓋哪些不同作用機制的藥劑？請在每一個作用機制列舉一個藥劑的中文普通名。
6. 請說明以殺蟲劑作為害蟲防治工具的優缺點。
7. 如果殺蟲劑的使用在害蟲防治是無可避免的手段，試說明如何克服與改善使用殺蟲衍生的問題。
8. 近年來政府推動食安五環及農藥減量政策，在執行面應如何進行？
9. 近年來各地發生蜜蜂猝死蜂群大量減少，造成許多作物受受到嚴重影響。其原因為何？如何解決？並舉出五種可替代之授粉昆蟲？
10. In field, some insects act as vectors of phytopathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae, etc. As you know, there are different patterns (mechanisms) of virus-transmission, please describe them in details and design the suitable management strategies against one of them (anyone is OK).
11. For an increased public perception of the dangers associated with chemical insecticides, various entomopathogenic agents had been developed for microbial control. Please describe the infective processes of available bacterial-, fungal-, viral-, and nematode-based pesticides.
12. The three ways in which biocontrol agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control programme.
13. Please explain the definition of “cultural control”. How to use the techniques of cultural control for pest management in the fields? (15%)
14. What is microbial control of insect pests? Discuss the mode of actions of their infection process and how to enhance the effectiveness for control insect pests in the field application. (15%)
15. What is insect sex pheromone? Please describe how to use it in IPM (integrated pest

management).(10%)

16. Please explain the difference between biological control and natural control. (10%)
17. Carbamates, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please describe the modes of action (MOA) of them, respectively, and compare their superiorities and defects with each other.
18. What are the difference between the “Economic Threshold” and the “Economic Injury Level”? Please give an example to explain it, and describe the importance of ET in integrated pest management (IPM).
19. Insects are the majority vectors of arthropod-borne pathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae. Please give one example for the transmission pathway (mechanism) of plant pathogens by vectors.
20. The three ways in which bio-control agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control programme (i.e., imported natural enemy from other country).
21. Describe “physical control” and explain how to apply them in pest management in the fields?
22. Describe “cultural control” and explain how to apply them in pest management in the fields?
23. Describe the definition of “male annihilation technique”, and give an example to explain the strategy.
24. Define “classical biological control”, and explain the procedures in pest control.
25. What is the difference between the “Economic threshold” and “Economic injury level”? Please give an example to explain it.
26. Certain insects, such as flies, lice and mosquitoes can transmitted some insect-vector-borne human diseases and sickness of domesticated animals. Please describe some (>5 cases) major infections transmitted by insect vectors.
27. Almost any animal can be a pest. What makes a major pest? Many things, such as environmental conditions, seasonal differences, man’s management practices, the biological characteristics of pest, etc. Please describe all the factors as possible as you can.
28. Many environmental factors determining changes of abundance of insect populations in the field. Please describe the density-dependent and density-independent factors which would affect the abundance of pest populations.
29. Pesticides are the most popular, effective, rapid and convenient agents to eliminate the outbreak pests. If you are responsible for the development of new insecticides. What’s your concern about the safety to plant, human, non-target organisms? How to

- evaluate and prove it by screen tests?
30. Many insecticides are targeting the nervous system of insect, could you list all the varieties of routes whereby the toxin reaches the insect?
  31. The chemicals that plants produce to protect themselves against insect attack belong to a group that includes compounds known as secondary plants substances. These plant-based chemicals, such as Rotenone, Sabadilla, Neem etc., are known as botanical insecticides. So far, there is still lack of commercial development of these phytochemicals, even they are much safer to mammals. Please give some of the reasons for it.
  32. What is the mode of action (infection process) of *Bacillus thuringiensis* (Bt)? Please give an example of Bt commercial product for controlling the pest and describe the cautions about application.
  33. What is the mode of action (infection process) of entomofungi? Please give an example of entomofungi for controlling the pest and describe the cautions about application.
  34. Using plants that are resistant to attack by arthropod pests is clearly an attractive option, particularly if the resistance is complete in the sense that the attacking organism is no longer able to cause economic damage. Please describe different resistance mechanisms, and give an example for each type.
  35. Please list the techniques for producing resistant plants, and describe the potential problems with host-plant resistance.
  36. Please describe the methods of genetic manipulation, and give an successful case of controlling by SIRT (sterile insect release technique).
  37. What are biorational compounds? Please give an example regarding how to use the insect growth regulators to control pests.
  38. 試詳述何謂 Integrated Pest management ？是述其系統架構及基礎？IPM 的施行步驟為何？任舉一例說明其施行方法？
  39. 何謂 economic injury level 及 economic threshold 如何利用前面兩項來分辨害蟲的等級？
  40. 何謂 Cultural techniques ？目前有哪些技術已被採用？並舉例說明各種技術之方法及所防治之害蟲對象？
  41. 何謂 IGR ？包含哪幾大類？對害蟲之作用機制為何？Methoprene 在使用上有哪些缺點？
  42. 試述蟲生真菌在田間造成流行病(epizootic)之過程？
  43. 試比較寄生性及捕食性天敵在生態學及應用上有何不同？

44. 建立一個 Classical biological control 計畫需要具備哪些步驟？
45. 試依培養、時效及操作特性等觀點，比較三種常用之生物防治法的差異？
46. 試比較寄生性及捕食性天敵在生態學 及應用上有何不同？
47. 試述蟲生真菌入侵昆蟲造成致病過程？試說明蟲生真菌防治害蟲之優缺點？
48. 昆蟲之所以成為害蟲其可能的因素有哪些？
49. 試述 *Bacillus thuringiensis* 及其產物對昆蟲之效應？如何應用此資材於害蟲防治工作。
50. 繪圖說明昆蟲病原性病毒的基本結構，種類及對昆蟲的感染機制？田間應用需注意事項。
51. 詳述 Type of resistance ？及所包含的機制？
52. 何謂 Antibiosis？該植物本身具有哪些生理生化特性？對昆蟲產生的作用機制有哪些？
53. 利用農耕操作防治害蟲時，對寄主作物及做環境可進行哪些操作技術？
54. 如果你是菜農以蔬菜為例，如何規劃一個完善的 Organic farming system？
55. 造成昆蟲對寄主植物偏好成度的機制可能有哪些？
56. 利用抗蟲品種所衍生哪些潛在問題？試詳述之
57. 何謂 Cultural techniques？目前有哪些技術已被採用？並舉例說明各種技術之方法及所防治之害蟲對象？

99/01 I

1. What is the difference between the “Economic Threshold” and the “Economic Injury Level”? Please give an example to explain it.
2. What is the mode of action (infection process) of nematode? Please give an example of nematode for controlling the pest and describe the cautions about application.
3. Please describe the definition of “integrated pest management”, and give an example (any crop and pest) to list the processes and strategy (example).
4. What is pheromone? Please describe their functions of various types. How to use pheromone in IPM?
5. Cultural techniques comprise those that involve the manipulation of an agroecosystem in order to decrease the success of pest species within it. Please describe the relative techniques for improving plant health.

99/01 II

1. Insects are the major vectors of arthropod-borne pathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae. Please describe the interactions between vector and plant pathogens.
2. There are annual predictable migrations of many pests. These migrations can be over very large distances. Please describe the possible monitoring and controlling approaches we can do before those making big problems.
3. The modes of action (MOA) of organochlorines, organophosphates, carbamates, synthetic pyrethroids, avermectins, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please describe the superiorities and defects of them.
4. What is the mode of action (infection process) of nucleopolyhedrovirus (NPV)? Please give an example of NPV for controlling the pest and describe the cautions about application.
5. Since the first well-documented success with a biological control agent in 1888 to the present there have been more than 5000 different attempts at classical biological control. Please describe the methods of using biocontrol agents and give a schematic of a stepwise procedure for establishing a classical biological control programme.

99/02 I

1. Explain “botanical insecticides” by using five chemicals as examples. Describe their toxicological mechanisms and list the target pests for each chemical.
2. What is “physical control” of pests? Please illustrate their application in the fields.
3. Describe all kinds of pheromone functions, and explain how to apply them in pest control.
4. How to use “biotechnological methods” in transgenic plants in pest control system?
5. What is the mode of action of entomopathogenic fungi infecting insect pest? How to apply entomopathogenic fungi in the fields for the pest control?

99/02 II

1. Insects cause damages to plants in directly feeding or indirectly pathogen-vectoring way. There are lots of vectors responding for transmission of arthropod-borne pathogens. Please give an example to describe the interactions between vector and plant pathogens. In addition, list the possible control methods.
2. Carbamates, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please describe the modes of action (MOA) of them, and give an example to describe their superiorities and defects.
3. What are the difference between the “Economic Threshold” and the “Economic

Injury Level”? Please give an example to explain it, and describe the importance of ET in pest management.

4. What is the insecticidal mode of action (infection process) of *Bacillus thuringiensis*? Please give an example of *B. thuringiensis* subsp. *kurstaki*, *aizawai*, and *israelensis* for controlling the pests and describe the cautions about application.

100/01 I

1. In agroecosystem, some insects act as vectors of arthropod-borne pathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae. Please describe all the four patterns (mechanisms) of viral transmission by these vectors. By the way, take an example of pest management strategies against them.
2. The modes of action (MOA) of organophosphates, synthetic pyrethroids, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please list a table to give a common name of representative insecticide in each group, and describe their MOA.
3. For an increased public perception of the dangers associated with synthetic insecticides, various entomopathogenic agents of biological control had been explored. Please list commercially available bacterial-, fungal-, viral-, and nematode-based formulations for arthropod control (including microbial agents, the processes of infection, and target pests respectively).
4. The three ways in which biocontrol agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control programme.
5. What is the definition of integrated pest management? Please give me a proposed model IPM system based around the use of transgenic corn (Bt-GMO).

100/01 II

1. What is insect sex pheromone? Discuss how it used in IPM (integrated pest

management).

2. Give examples to discuss the difference between “MAT (male annihilation technique)” and “SIT (sterile insect technique) and their application in IPM (integrated pest management).
3. What is microbial control of insect pests? Discuss the mode of actions of their infection process.
4. Give example to discuss how to use “physical control” in pest management in the fields.
5. What is insect vector transmission of plant pathogen and discuss the interaction between vector insects and plant pathogens.

100/02 I

\* 第 1、2 題各 15 分，第 3 題 20 分，除文字外亦可製圖、表應答。

1. 利用生物技術研發抗蟲基改品種農作物必需考量的問題為何？另請敘述 *Bacillus thuringiensis*  $\delta$ -endotoxin expressing GM corn 對天敵(predator and parasitoid)可能造成之影響，再列舉如何降低該等負面衝擊之措施。
2. 請就偵測(detection/diagnosis)、監測(monitoring/inspection)、預測(forecasting/projection)、預警(early warning/alert for control timing)等層面探討目前國內長期以來執行重要病蟲害防治之改進空間，依此提出您的建議(可用東方果實蠅 或 斜紋夜蛾為例，此二種害蟲已耗費政府數十年之經費人力但仍難以掌控，亦可用其他害蟲~如小黑蚊，薊馬，褐飛蝨…等)。
3. 台灣農地面積有限，農業生產多屬小農制，為提高生產量農民經常依賴化學藥劑的使用，而造成殘留農藥違反國家食品衛生安全容許量之標準，甚至在施藥時承

受中毒之風險，且造成部份重要害蟲之抗藥性產生，導致害蟲管理更難以奏效。政府近年來提倡『植物醫生』之觀念，並有少部份鄉鎮已有實施，但其實務效益有限。試寫出一套具有可行性的計畫來改善目前農藥誤用或濫用的情況(包含教育、管理及推廣輔導之層面)。

100/02 II

- 一、 何謂微生物防治(microbial control)? 試述三種蟲生病原導致昆蟲感病的機制及如何增強其田間防治應用效能。(20%)
- 二、 物理防治(physical control)包含那些防治技術及如何應用於害蟲綜合管理。(10%)
- 三、 何謂性費洛蒙? 試舉例說明如何應用於害蟲管理。(10%)
- 四、 何謂“classical biological control”? 防治應用時需考慮何施行步驟。(10%)

101/01 I

(Please choose 5 test questions from them)

1. Insects are the majority vectors of arthropod-borne pathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae. Please describe the transmission pathway (mechanism) of plant pathogens by vectors. (please give one example for description)
2. The modes of action (MOA) of organochlorines, organophosphates, synthetic pyrethroids, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please describe the superiorities and defects of them.
3. Please propose one Integrated Pest Management (IPM)-based Farming System for a citrus orchard. (you may give an example of any else crop)
4. What is the mode of action (infection process) of nuclearpolyhedrosis virus (NPV)? Please give an example of NPV for controlling the pest and describe the cautions about application.



5. Cultural techniques comprise those that involve the manipulation of an agroecosystem in order to decrease the success of pest species within it. Please describe the relative techniques for improving plant health.
6. The three ways in which biocontrol agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control program.

101/01 II

1. Explain the interactions between insect vectors, plant viruses and their hostplants on transmitting insect-borne plant diseases, and describe how to manage the disease transmission in the fields.(15%)
2. Give an example to explain how to enhance microbial control effect in pest management in the fields.(10%)
3. Describe “cultural control” and explain how this concept is applied in pest management in the fields?(10%)
4. Define “classical biological control” and explain the procedures in pest control.(15%)

102/02 I

1. 請闡述蘇力菌(*Bacillus thuringiensis*)對鱗翅目害蟲之致病機制；而近十年來國際上利用 *Bacillus thuringiensis*  $\delta$ -endotoxin expressing 轉殖玉米來抗玉米螟及玉米穗蟲之為害，請分別就此害蟲之寄生蜂與捕食性天敵(parasitoid and predator)可能造成之影響探討 GMO 在生態上可能造成之負面衝擊。(15 分)
2. 請就檢疫 (quarantine)、偵測 (detection/diagnosis)、監測 (monitoring/inspection)、預測 (forecasting/projection)、預警 (early

warning/alert for control timing)等層面探討目前國內可能已入侵之西方花薊馬(*Frankliniella occidentalis*)之檢疫漏洞，並列舉可行之防治措施。(15分)

3. 台灣農業生產多屬小農制，為提高生產量農民經常依賴化學藥劑的使用，但常因農民誤判害蟲種類而用錯藥劑，或者頻頻增加用藥濃度而造成農藥殘留違反國家食品衛生安全容許量之標準，甚至在施藥時承受中毒之風險，且造成部份重要害蟲之抗藥性產生，導致害蟲管理更難以奏效。假設您是農委會防檢局相關業務承辦人員，為了要改善上述問題，而受命負責建立我國之『植物醫生』制度。試寫出一套具有可行性的推行計畫(從學校到農場)，來達成解決或改善目前農藥誤用或濫用的情況。(20分)

102/02 II

1. What is microbial control of insect pests? Please describe the mode of actions (infection process) of these microorganisms. (20%)
2. What is cultural control of insect pests? Please describe their application in the fields. (10%)
3. Define “classical biological control” and explain the procedures in pest control. (10%)
4. Describe the definition of “areawide pest management”, and give an example to explain the strategy. (10%)

103/02 I

1. 請列舉三種蟲生病原(包含真菌、細菌、病毒)可用於十字花科蔬

菜田防治夜蛾類幼蟲，並闡述其對鱗翅目害蟲之致病機制，及建議使用方法與注意事項。(15分)

- 2.請列舉三種近年來已成功入侵我國之農業害蟲，包括其中文名、學名、為害方式(作物)、目前造成之經濟損失及可行之監測與防治措施。(15分)
- 3.台灣農民在田間進行病蟲草害管理時，經常施用化學藥劑，但頻頻造成噴藥中毒或農藥殘留違反國家食品衛生安全容許量標準之事件。為解決上述問題，近年來農委會及衛服部相關單位推行了可能改善農民誤用(濫用)藥劑或農產品食安出包的策略，如「農藥延伸使用 off-label use」、「植物醫生」、「農藥代噴業者」、「農產品產銷履歷」等。請您就所學所知推敲上述的每個策略執行之必要性及成敗論。(20分)

103/02 II

- 1.試述檢疫害蟲偵測與田間重要害蟲監測的用途與差異(10%)。
- 2.試述耕作防治(cultural control)的定義及田間可應用的相關技術(10%)。
- 3.試述經濟限界(閾值)(economic threshold, ET)及經濟危害水平(economic injury level, EIL)的定義(10%)。
- 4.各種作物栽培期間，鱗翅目害蟲發生極為頻繁，常影響植株生長與產量，試述除化學防治外，可行的防治方法(10%)。
- 5.任選以下一種近年來入侵的害蟲，敘述其主要為害對象及造成之危害情形(10%)。

*Paracoccus marginatus*

*Procontarinia robusta*

*Tessaratomia papillosa*

104/01 I

- 1.試闡述三種具經濟重要性之葉蟎在台灣農業系統中，造成之為害情形(發生時期、寄主作物、經濟損失)、以及田間防治上遭遇的困難。並請任列舉其中一種害蟎，就密度監測(monitoring/inspection)、非農藥防治技術應用、與即時正確用藥等層面，提出您對該等害物之綜合管理策略的建議。(25分)
- 2.台灣農業生產面積有限，為提高生農作物產量，農民慣於使用化學藥劑，而可能造成農藥殘留違反國家食品衛生安全容許量標準之情形。近年消費者對於食安問題已愈來愈重視，農政單位亦因此努力提倡『植物醫生』與『農藥代噴業者』之制度，然其實務效益有限、緩不濟急、兩種制度間亦缺乏連貫作業。請您就以如何改善農民用藥、提升食品安全為議題，試寫出一套具有可行性的計畫(包含農藥販賣及使用管理、農民教育及農政單位或學校推廣輔導作業等層面)。(25分)

104/01 II

- 1.東方果實蠅為台灣果樹的重要經濟害蟲，試述在目前栽培環境下，較適合推廣予農友應用的防治策略有那些。(10%)
- 2.試以二點葉蟎為例，敘述其生活史、在作物上的危害徵狀，及除化學防治外可行應用的管理策略。(10%)
- 3.請分別敘述細菌與真菌二類蟲生病原微生物導致昆蟲感病的機制(10%)
- 4.何謂物理防治(physical control)?可應用於積穀害蟲管理的技術有那些(10%)
- 5.試以有機蔬菜種植為例，說明有那些耕作防治(cultural control)技術可應用於蟲害管理。(10%)

104/01 I

1. In field, some insects act as vectors of phytopathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae, etc. As you know, there are different patterns (mechanisms) of virus-transmission, please describe them in details and design the suitable management strategies against one of them (anyone is OK). (20 points)
2. For an increased public perception of the dangers associated with chemical insecticides, various entomopathogenic agents had been developed for microbial control. Please describe the infective processes of available bacterial-, fungal-, viral-, and nematode-based pesticides. (15 points)
3. The three ways in which biocontrol agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control programme. (15 points)

104/02 II

1. Please explain the definition of “cultural control”. How to use the techniques of cultural control for pest management in the fields? (15%)
2. What is microbial control of insect pests? Discuss the mode of actions of their infection process and how to enhance the effectiveness for control insect pests in the field application. (15%)
3. What is insect sex pheromone? Please describe how to use it in IPM (integrated pest management).(10%)
4. Please explain the difference between biological control and natural control. (10%)

105/02 I

1. Carbamates, nicotinoids, and insect growth regulators (IGRs) are different from each other. Please describe the modes of action (MOA) of them, respectively, and compare their superiorities and defects with each other. (15 points)
2. What are the difference between the “Economic Threshold” and the “Economic Injury Level”? Please give an example to explain it, and describe the importance of ET in integrated pest management (IPM). (10 points)
3. Insects are the majority vectors of arthropod-borne pathogens, such as Aphididae, Aleyrodidae, Psyllidae, Cicadellidae, Delphacidae and Cercopidae. Please give one example for the transmission pathway (mechanism) of plant pathogens by vectors. (10 points)
4. The three ways in which bio-control agents can be used, such as classical biological control, augmentation/inoculation, and habitat manipulation. 1). How to choose the most appropriate way for the pest control in different situations? 2). Please give a schematic of a stepwise procedure for setting up a classical biological control programme (i.e., imported natural enemy from other country). (15 points)

105/02 II

1. Describe “physical control” and explain how to apply them in pest management in the fields? (10%)
2. Describe “cultural control” and explain how to apply them in pest management in the fields? (10%)
3. Describe the definition of “male annihilation technique”, and give an example to explain the strategy. (10%)
4. Define “classical biological control”, and explain the procedures in pest control. (10%)
5. What is the difference between the “Economic threshold” and “Economic injury level”? Please give an example to explain it. (10%)