Mid-Semester Examination

Date: 17th September 2024

Total Marks: 40
Duration: 2 hrs

Name:

Roll No:

SECTION - A (10 Marks)

1. Systemic spread of viral genome in plants is carried out by
   (A) insect vector (B) movement protein (C) replicase protein (D) nuclear shuttle protein

2. Following is TRUE about microRNA
   (A) targets mRNA to form duplex RNA (B) regulates transcription factors
   (C) targets transposon activation (D) regulates downstream genes

3. Insecticidal Bt protoxins are converted to active toxins in
   (A) plant tissues expressing Bt gene (B) insect mid-gut at acidic pH
   (C) plant tissues sprayed with Bt spores (D) insect mid-gut at alkaline pH

4. microRNAs are originated from
   (A) mRNA degradation (B) sub-genomic RNA (C) plant-made siRNAs (D) *MIR* genes

5. The following protein slices RNA-duplex as well as remains associated with miRNAs and also siRNAs
   (A) AGO1 (B) DICER (C) AGO4 (D) RdRP

6. Replication of plant DNA virus genome takes place in
   (A) cytoplasm (B) nucleus
   (C) both cytoplasm and nucleus (D) chloroplast

7. Following viral proteins is lately translated
   (A) coat protein (B) nuclear shuttle protein (C) host suppressor (D) movement protein

8. Strength of a plant promoter is controlled by cis-regulating DNA elements located in
   (A) TATA box region (B) distal region (C) CAT box region (D) downstream region

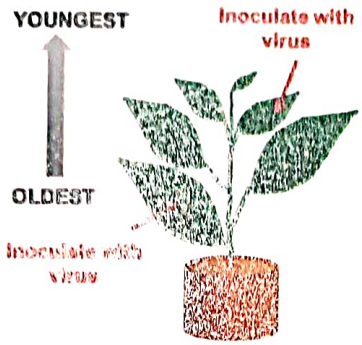
9. A synthetic plant promoter could be engineered by making changes to following region of native promoter
   (A) distal region (B) core promoter (C) transcription factor (D) downstream region

10. A bi-directional plant promoter is engineered by making changes to
    (A) distal region (B) core promoter (C) transcription factor (D) downstream region

SECTION - B

[30 Marks; attempt any 6 (5 marks each)]

1. Why new leaves formed on previously virus-inoculated plants are symptom free, even after re-inoculation?



2. How loss-of-function and gain-of-function mutants are generated and analysed for identifying gene function?

3. Tobacco plants overexpressing TMV coat protein gene were symptom free (plants with green leaves), whereas the control plants became susceptible to TMV infection (leaves turned yellow). Where does the TMV resistance in CP over-expressing plants come from ?

Fig: Tobacco plants (control and TMV CP gene overexpressing) inoculated with a severe yellow strain of TMV

4. Explain the reason for formation of pigment-less flower (extreme right) instead of dark purple flowers (middle) when petunia plants overexpressed the anthocyanin pigment biosynthesis genes.

5. How plants transposable elements remain under control? How these mobile genetic elements regulate plant transgenerational memory?

6. What is the basis of virus resistance in transgenic plants producing viral proteins in inappropriate (a) form, (b) amount, and time ?

7. How these two small RNA molecules (siRNA and microRNA) differ from each other in their biogenesis and regulatory role in plants?

8. What makes a promoter's activity very specific, allowing gene expression in particular tissue type, developmental time-dependent, and stress inducible?