WHAT IS CLAIMED

1. A method of diagnosing Shade Avoidance Syndrome (SAS) in a plant comprising:

obtaining a Raman spectra of carotenoids *in vivo* and *in situ* in tissue of a plant leaf at a first point in time, wherein the Raman spectra includes one or more peaks characteristic of carotenoids;

obtaining a Raman spectra of carotenoids *in vivo* and *in situ* in the tissue of the plant leaf at a second point in time, wherein the Raman spectra includes the one or more peaks characteristic of carotenoids;

comparing intensity of the one or more peaks characteristic of carotenoids from the Raman spectra obtained at the first point of time with intensity of the one or more peaks characteristic of carotenoids from the Raman spectra obtained at the second point of time; and

determining if there is a decrease in the relative intensity of the one or more peaks characteristic of carotenoids from the Raman spectra obtained at the second point in time,

wherein a decrease in relative intensity of one or more peaks characteristic of carotenoids from the Raman spectra obtained at the second point of time is indicative of SAS, and

wherein obtaining of the Raman spectra is non-invasive and non-destructive to the tissue of the plant leaf.

2. The method of claim 1, wherein the tissue of the plant leaf is a leaf blade or a leaf petiole.

3. The method of claim 1 or 2, wherein the tissue of the plant leaf is the leaf blade.

4. The method of any one of claims 1-3, wherein the one or more peaks characteristic of carotenoids in the Raman spectra are selected from the group of peaks consisting of 1004 cm^{-1}, 1150 cm^{-1} and 1521 cm^{-1}.

5. The method of any one of claims 1-4, wherein the Raman spectra is obtained using near-infrared excitation wavelength.

6. The method of claim 5, wherein the near-infrared excitation wavelength is 830 nm.

7. A method of preventing or slowing the further development of Shade Avoidance Syndrome (SAS) in a plant comprising:

diagnosing SAS in a plant according to the method of any one of claims 1-6; and

reducing the amount of shade affecting the plant.

8. The method of claim 7, wherein shade is reduced by providing light to the plant.

9. The method of claim 7, wherein shade is reduced by trimming nearby plants.