No.5

Seminar I on Agricultural Process Engineering
農産加工学演習 I

Naoshi Kondo, Hiroshi Shimizu

Division of Environmental Science & Technology,

Graduate School of Agriculture, Kyoto University

農学研究科　地域環境科学専攻

近藤　直・清水　浩

An energy flow from light source to output of TV camera

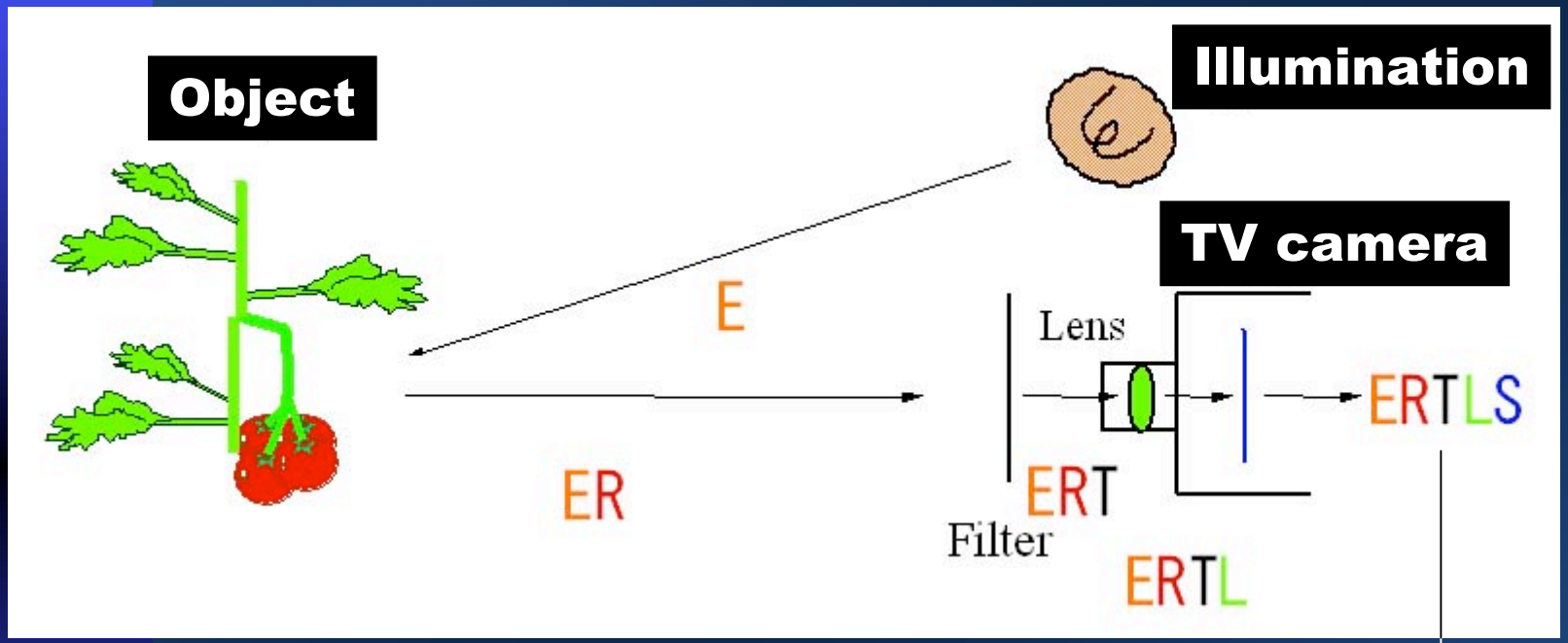


Image grabber and/or PC

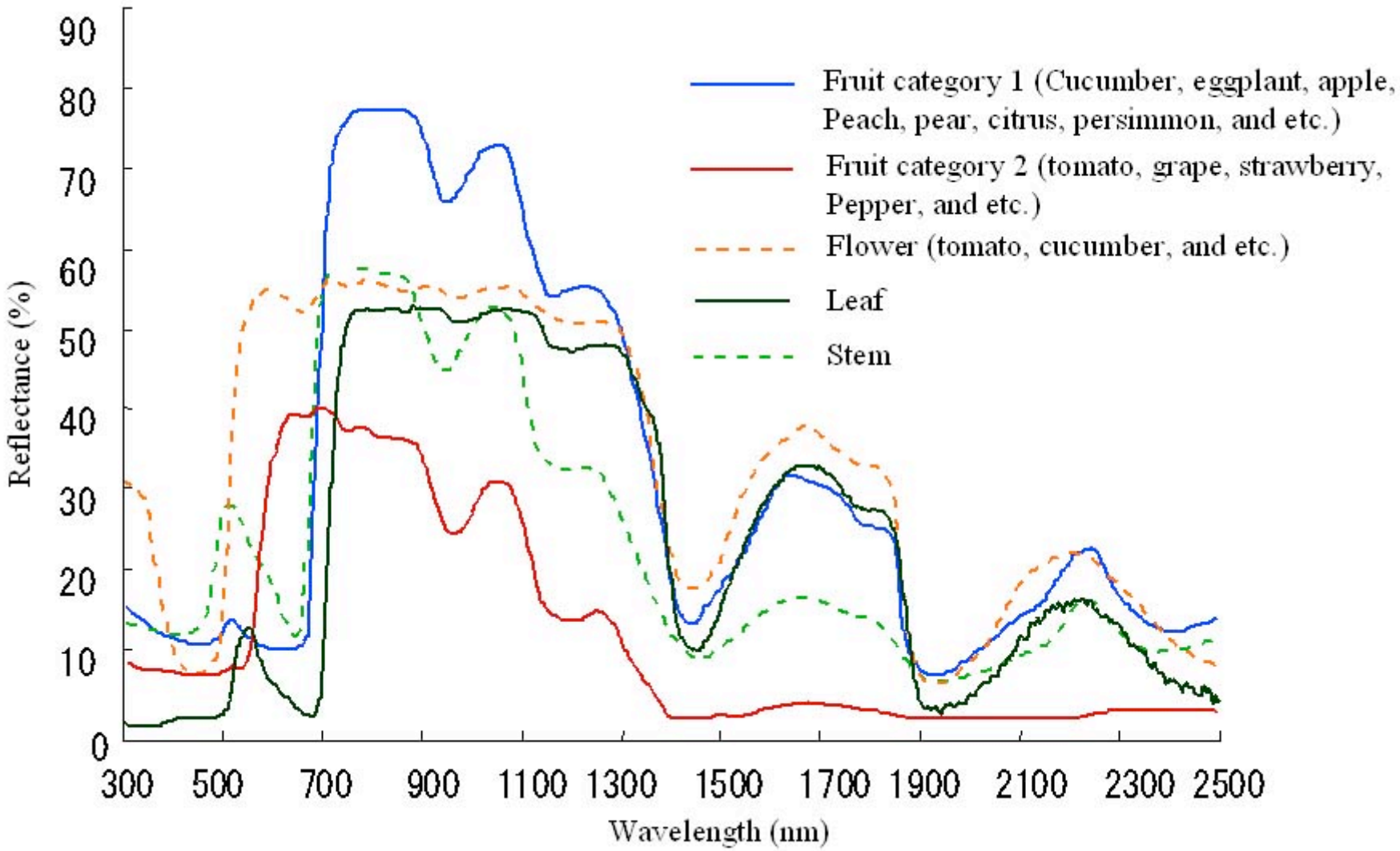
Optical properties of objects

- Spectral reflectance -

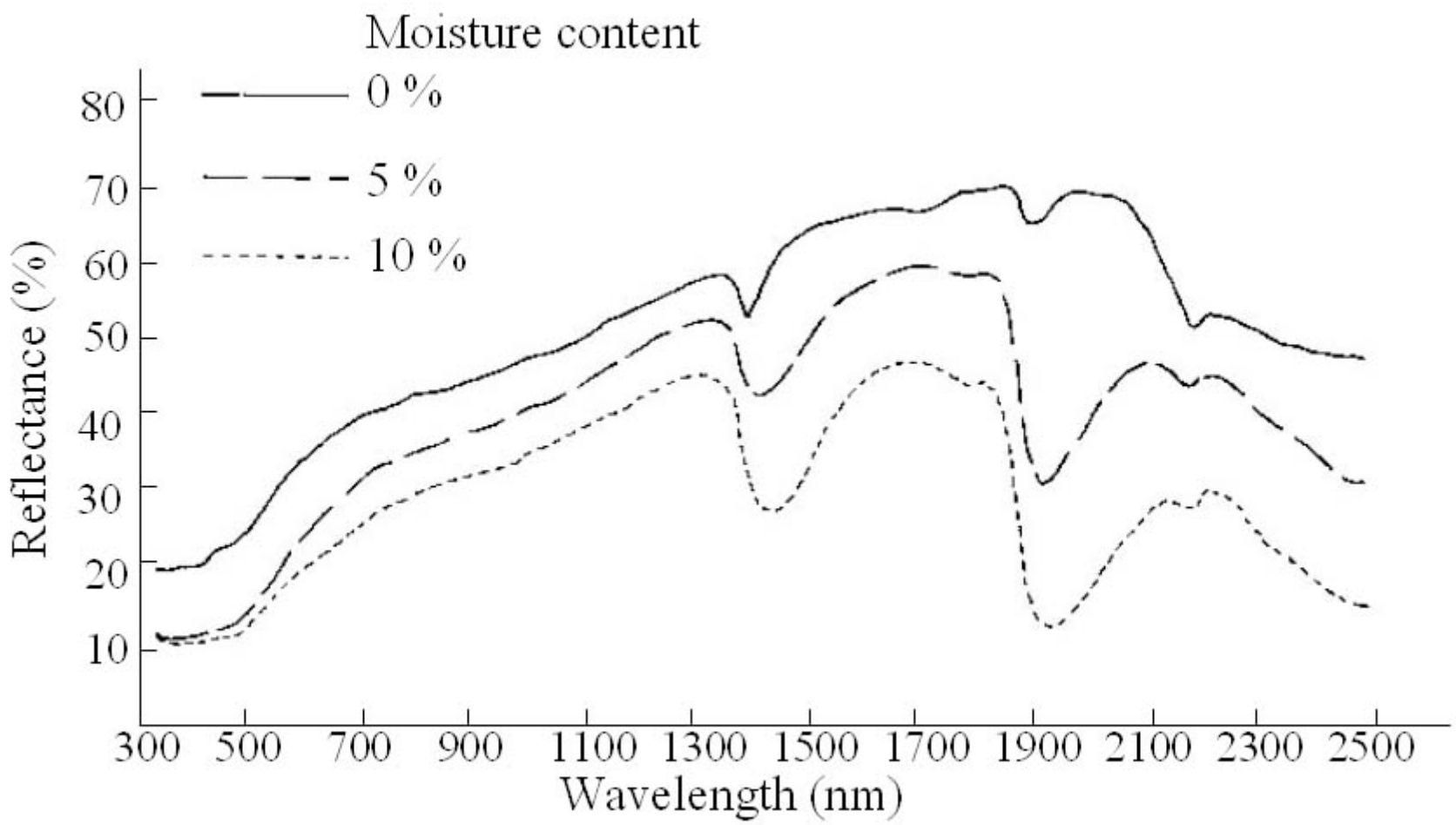
Agricultural
Process
Engineering
Laboratory

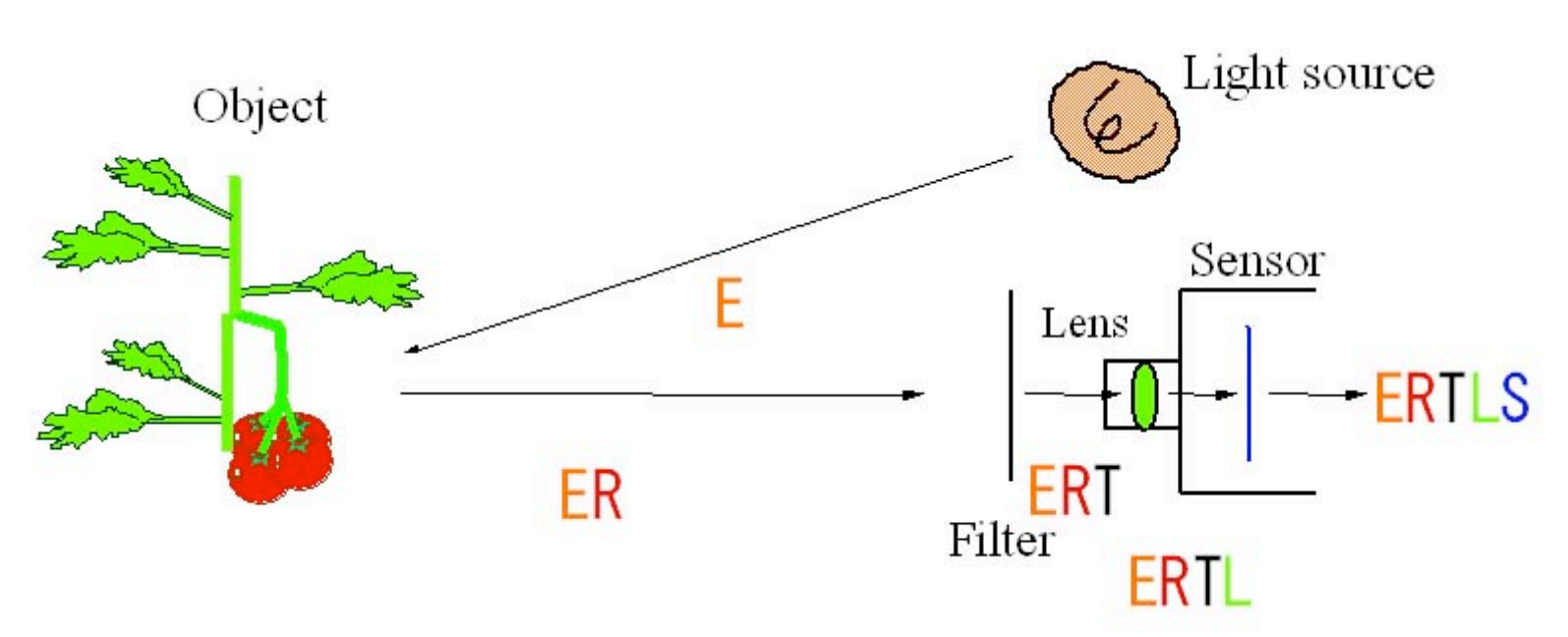
KYOTO 京都大学 UNIVERSITY

Spectral reflectance of plant parts



Spectral reflectance of soil





$$O_{ai} = \sum E \cdot R_a \cdot T_i \cdot L \cdot S \cdot \Delta\lambda \quad (i=1, 2)$$
$$O_{bi} = \sum E \cdot R_b \cdot T_i \cdot L \cdot S \cdot \Delta\lambda \quad (i=1, 2)$$

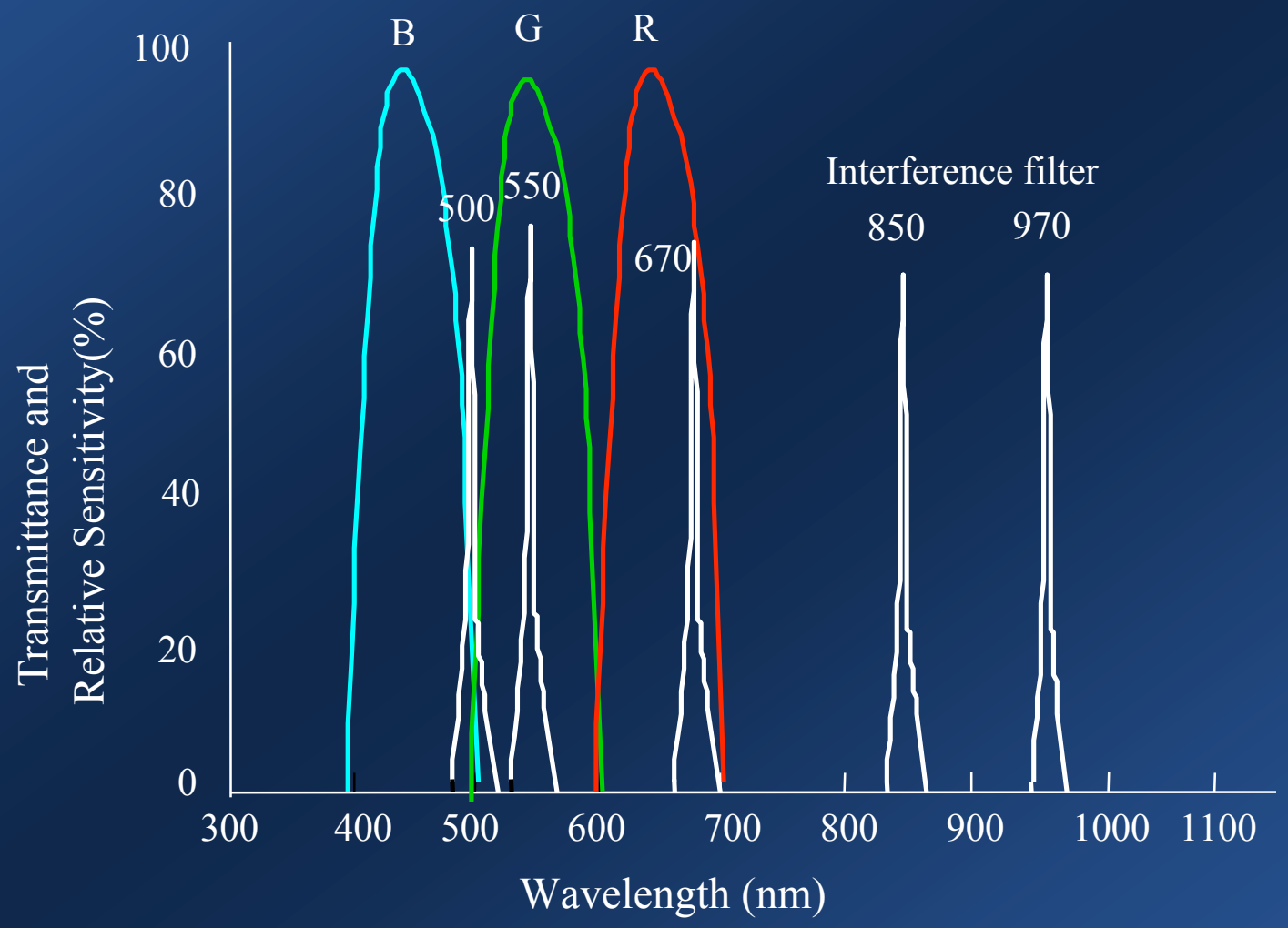
$$C = \frac{O_{a2} - O_{a1}}{O_{a1} + O_{a2}} - \frac{O_{b2} - O_{b1}}{O_{b1} + O_{b2}}$$

a, b : object
i:filter number

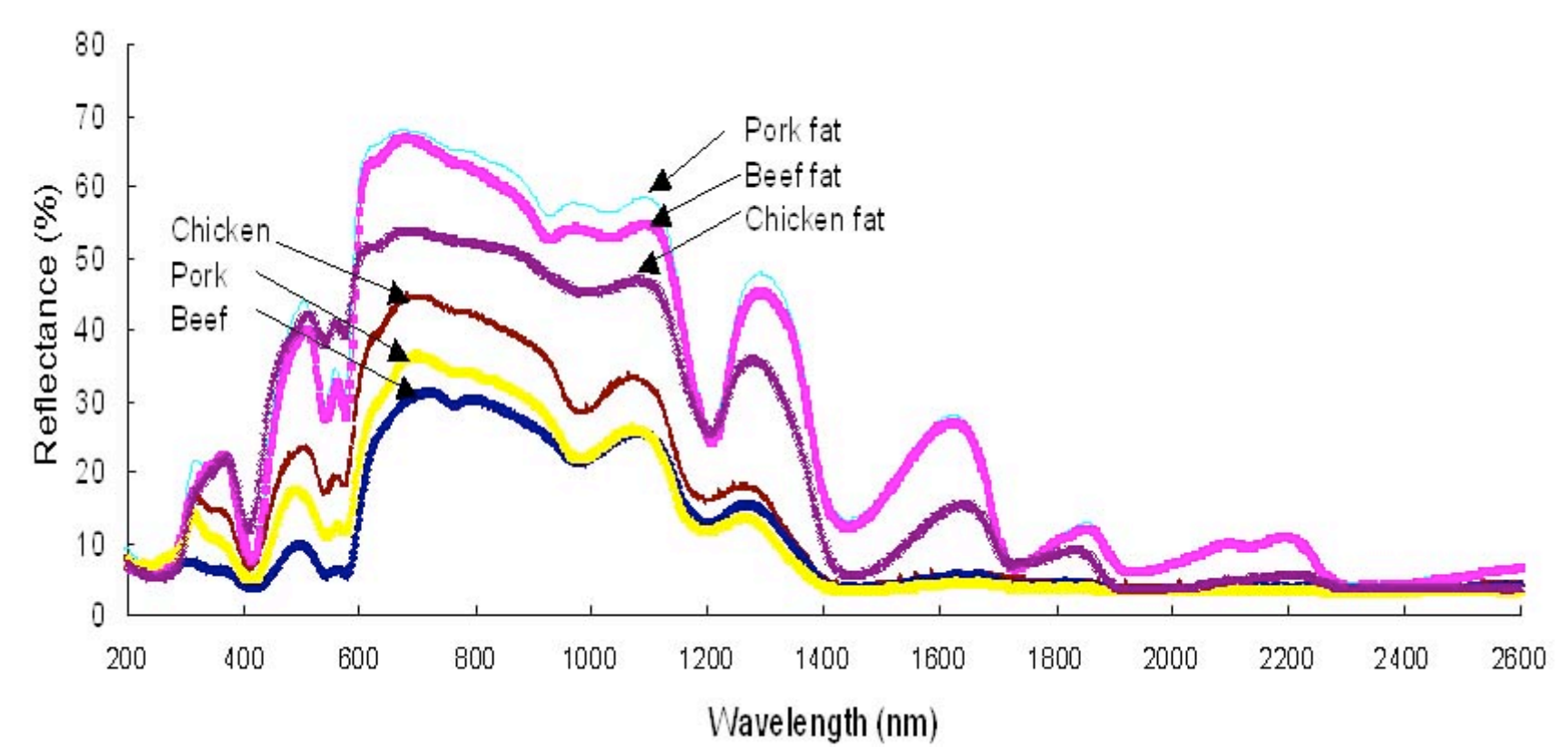
Most suitable wavelength bands to discriminate fruits from leaves

	Wavelength (nm)	Band width (nm)	C
Tomato	980 670	8 5	0.850
Cucumber	550 800	17 5	0.357
Eggplant	550 880	16 5	0.466
Mandarin Orange	520 670	9 5	0.999
Persimon	520 680	14 5	1.1121

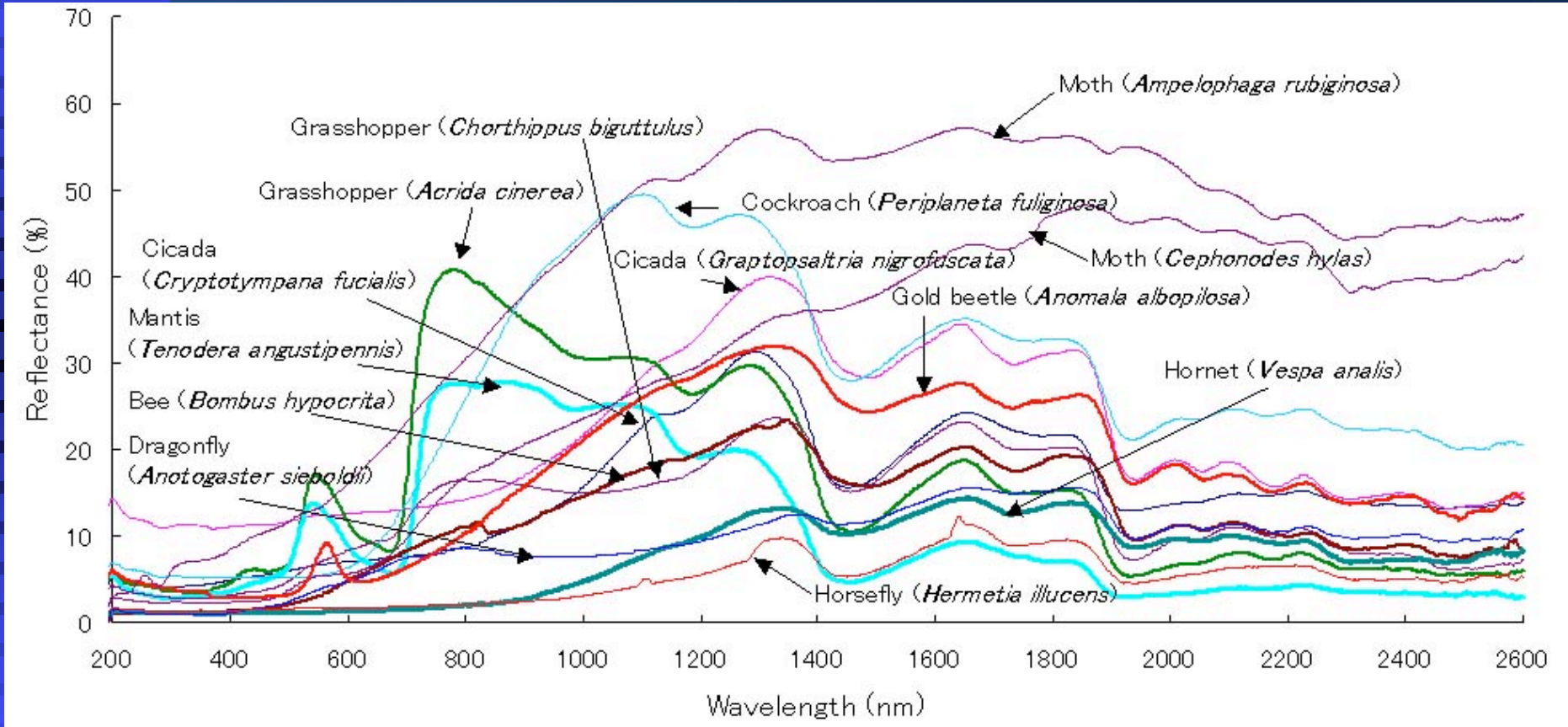
Transmittance of filters suitable for plant part discrimination



Spectral reflectance of beef, pork, and chicken



Spectral reflectance of insect bodies



Assignment

Describe what you learned on reflectance of plant parts (fruit, leaf, stem, and flower petal) in several sentences.