PLANT DOCTOR 405 • FIELD ASSESSMENT

Module 9 Review: The Kitchen-Staple Arsenal

Course Track: Phase 3 — Applied Living Soil & Low-Friction Growing

Evaluation: 10 Diagnostic Inquiries • Cut-and-Come-Again & Terpene Kinetics

Instructions: Apply Module 9 anatomical pruning rules, hormonal signaling pathways, and terpene volatilization principles to each culinary harvesting scenario. Choose the single most scientifically and culinarily accurate deduction.

Diagnostic Harvesting Inquiries (Questions 01–10)

01. In botanical anatomy, where are an herb's volatile aromatic terpenes (linalool, thymol, pinene) primarily synthesized and held?

A) In subterranean mycorrhizal fungal hyphae.

B) In microscopic glandular trichomes (resin glands) on the leaf surface.

C) Inside xylem vascular tubes alongside dissolved silica.

D) In central root meristems that pump aromatics upward during heat.

02. Within 24 hours of cutting and refrigerating fresh herbs, what percentage of volatile aromatic terpenes typically vaporizes?

A) Less than 2%.

B) Exactly 10%.

C) Up to 40%.

D) 100% (complete zeroing of all flavor).

03. Why do packaged fresh herbs in plastic grocery clamshells blacken, soften, and emit off-odors within 72 hours?

A) Trapped condensation and cellular respiration induce bacterial tissue rot.

B) Fluorescent lights convert cuticular wax into synthetic ethylene.

C) Cold air causes chlorophyll to convert permanently into carnauba resin.

D) Herb stems absorb atmospheric nitrogen and explode internal vacuoles.

04. In plant physiology, what hormone synthesized by the apical bud suppresses the development of lower lateral branches?

A) Cytokinin.

B) Auxin.

C) Gibberellic acid.

D) Ethylene gas.

05. When you snip a basil stem just above a leaf node, what hormonal shift triggers the two axillary buds to branch vigorously?

A) Auxin removal allows root-synthesized cytokinins to stimulate lateral cell division.

B) Wounding forces the plant to release abscisic acid into dormant flowers.

C) Stem cuts halt photosynthesis, diverting starches to taproot storage.

D) Nitrogen ions concentrate at the cut wound to form a callous cap.

06. What common harvesting error causes a Genovese basil plant to grow tall, leggy, woody, and rapidly bolt to flower?

A) Cutting whole central stems 1/8" above a two-leaf node junction.

B) Plucking individual large leaves from the bottom while leaving the terminal bud.

C) Irrigating the container living soil with aerated compost tea.

D) Exposing the foliage to six or more hours of direct patio sunlight.

07. When harvesting French thyme or rosemary, why must cuts never extend back into bare, old brown wood?

A) Old wood contains toxic levels of phenolic acids that sour sauces.

B) Bare woody tissue lacks adventitious buds required to regenerate green foliage.

C) Brown stems pull all soil moisture out of adjacent root hairs.

D) Cutting old wood reverses mycorrhizal fungal colonization in the pot.

08. How should looseleaf salad greens (e.g., Oakleaf, Butterhead) be harvested to ensure continuous production for months?

A) The entire plant must be cut level with the soil line every 3 days.

B) Strip the lowest, outermost mature leaves only, leaving the central rosette intact.

C) Pinch off the emerging central heart leaves while leaving

D) Pluck the fibrous root system halfway out of the wicking

Module 9 Answer Key & Agronomic Explanations

01 • B **Glandular Trichomes as Terpene Reservoirs**
Aromatic terpenes and essential oils are synthesized and held inside microscopic, bulbous glandular trichomes protruding from the epidermal cuticle. These delicate resin sacs are vulnerable to physical crushing and rapid thermal evaporation.

02 • C **Post-Cut Volatilization Kinetics**
The instant an herb stem is severed, hydrostatic turgor pressure collapses. Within 24 hours, even under refrigeration, cuticle dehydration fractures trichomes, causing up to 40% of volatile aromatics (linalool, pinene, thymol) to escape into ambient air.

03 • A **The Clamshell Micro-Climate Trap**
Severed herbs continue respiring in sealed plastic boxes, producing moisture that condenses on cool leaves. Trapped free water combined with cold cell-wall collapse creates an anaerobic environment that fosters rapid margin rot and off-gassing ammonia.

04 • B **Auxin-Driven Apical Dominance**
The apical bud produces auxin, which travels basipetally (downward) through the stem vascular system. Auxin actively suppresses the outgrowth of dormant axillary buds below it, prioritizing vertical expansion over lateral bushiness.

05 • A **The Auxin-Cytokinin Hormonal Axis**
Decapitating the lead terminal stem removes the auxin synthesis center. Root-produced cytokinins surge upward unopposed, stimulating cell division in the dormant axillary buds at the leaf node, transforming one stem into two vigorous branches.

06 • B **The Bottom-Leaf Plucking Failure**
Plucking lower leaves preserves the apical bud and its auxin stream, starving side nodes while stripping photosynthetic solar collectors. The plant stretches into a single woody stalk, quickly initiates floral meristems (bolting), and ceases leaf production.

07 • B **Woody Shrub Regenerative Thresholds**
Semi-woody Mediterranean herbs (thyme, rosemary, sage) produce adventitious buds exclusively on green, non-lignified stems. Cutting deep into bare, lignified brown wood removes all growing points, resulting in permanent branch death.

08 • B **The Outer-Ring Harvest Strategy**
Non-heading greens generate new leaves from a central growing point (the apical crown). Removing only the mature outermost leaves provides an immediate salad harvest while allowing the central crown to continue photosynthesizing and pushing out fresh layers.

09 • A **Vascular Bundle Integrity & Cut Hygiene**
Dull blades crush xylem and phloem vessels rather than cleanly slicing them. Crushed vascular bundles invite fungal infections (Botrytis) and cause dieback down to the next node. Sharp snips 1/8" above the joint seal quickly with intact sap collars.

10 • B **Controlled Moisture Stress for Terpene Spikes**
Terpenes function botanically as defensive secondary metabolites. Tapering soil moisture 24–48 hours before harvest induces mild physiological drought stress, prompting the plant to concentrate essential oils in its trichomes for maximum culinary aroma.

MODULE 9 MASTERY TAKEAWAY
Exceptional herbs should never be bought dead in plastic clamshells. By executing precise anatomical cuts above active nodes and understanding plant hormonal signaling, a single square foot of mineral-charged living soil becomes an infinite, self-renewing culinary arsenal right outside your kitchen door.