1. CALENDAR OF EVENTS FOR VINEYARD AND PEST MANAGEMENT: NORTH COAST

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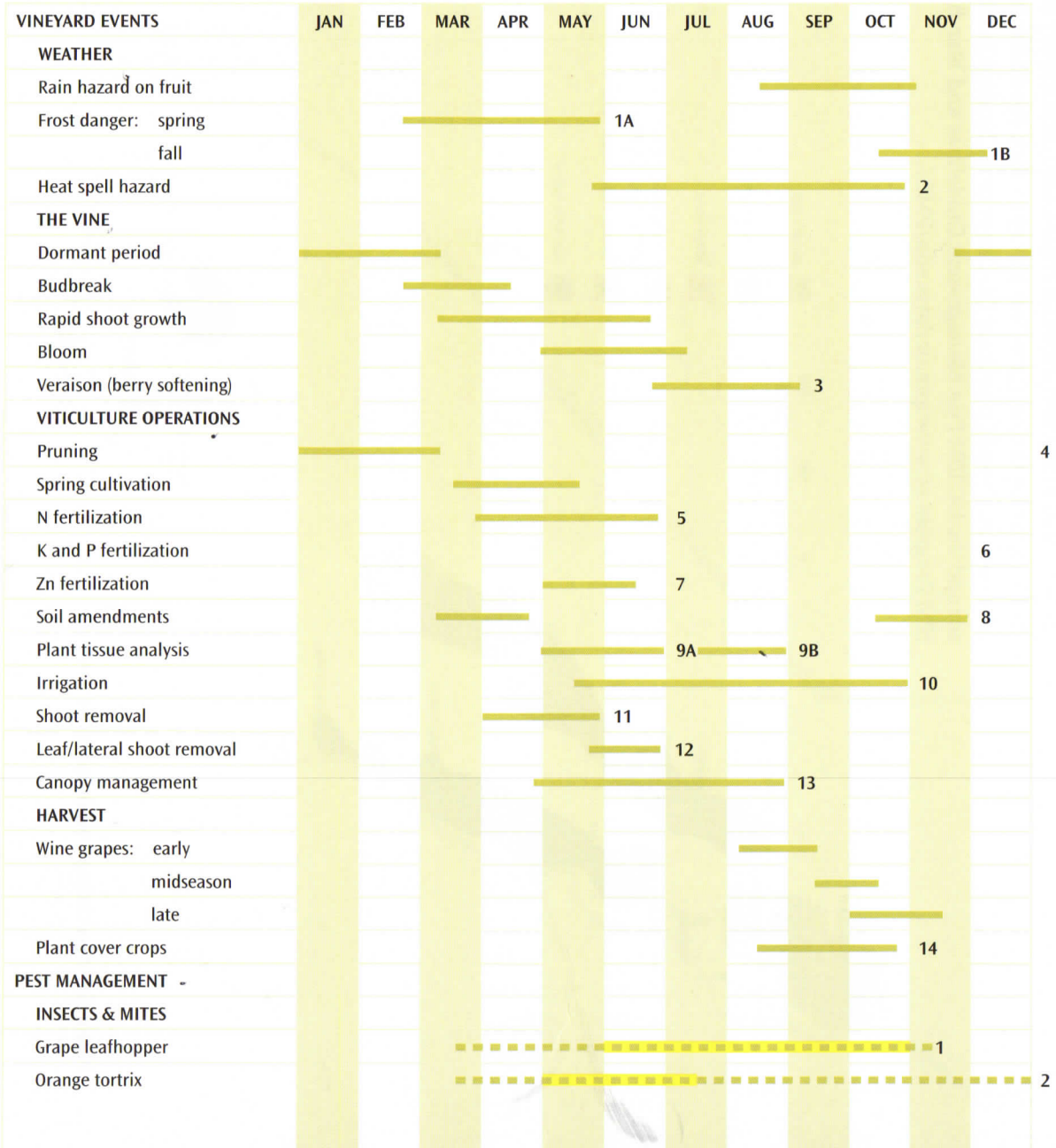


VINEYARD MANAGEMENT NOTES: NORTH COAST

1. Frost danger: (A) Spring: Mow or disk ground cover before frost period (allows time for winter rains to re-wet freshly disked ground). (B) Fall: Severe frost may defoliate vines and damage fruit, and may injure young vines with poor wood maturity.

2. Heat spell hazard: 2 or 3 days of high temperatures in bloom period can cause poor fruit set. Temperatures near or above 40.5°C (105°F) after set through ripening can damage fruit, depending on level of sunlight exposure.

3. Veraison (onset of ripening): Berries soften and sugar accumulation begins (8 to 10 Brix). Berries are no longer susceptible to new powdery mildew infection.

4. Pruning: Pre-pruning after leaf fall when followed by a final pruning near budbreak may reduce the incidence of pruning wound fungal infections.

5. Nitrogen (N) fertilization: Fertilize according to vineyard needs as judged by vine vigor and petiole nitrate-N level. In drip-irrigated vineyards, apply 1 month after budbreak and/or just after fruit set. In dry-farmed vineyards, apply so that spring rains can move N into root zone; avoid off-site N movement.

6. Potassium (K) and phosphorous (P) fertilization: If needed, apply K through the drip system for maintenance applications in summer, or per vine as a dry material in fall to correct a moderate or severe deficiency. Apply P in a similar manner, if needed.

7. Zinc fertilization: If needed, apply foliar sprays before or during bloom.

8. Soil amendments: Spread compost in spring or fall. Apply dry amendments in fall prior to winter rainfall.

9. Plant tissue analysis: (A) For bloom-time petiole analysis, sample 75 to 100 petioles opposite the flower clusters to assess macro- and micronutrient status. Nitrate-N levels give a general view of N status. (B) Petioles collected after veraison from recently matured leaves more accurately estimate vine potassium status.

10. Irrigation: Irrigate young bearing vineyards beginning in late spring (depending on rainfall) through harvest. Start irrigation in mature vineyards according to shoot growth, plant water status or available soil water. Avoid excessive spring shoot growth and preharvest leaf drop. Midseason (when shoot growth slows) and late-season (preharvest) applied water volumes may be similar. Apply a postharvest irrigation to maintain canopy until frost. Vines entering dormancy under dry conditions are less cold hardy. Some mature vineyards on deep soils are not irrigated.

11. Shoot removal: Remove unwanted shoots from vine base to head; also along cordons. Remove excess shoots from count buds to adjust crop level and reduce canopy congestion.

12. Leaf and/or lateral shoot removal: Exposing clusters may reduce Botrytis bunch rot and improve spray coverage. Grape quality will be influenced with increased exposure. Accomplish just after fruit set; late cluster exposure may cause sunburn.

13. Canopy management: Move trellis wires for positioned canopies. Hedge to maintain canopy shape, to shoot tip, or to facilitate cultivation and mechanization.

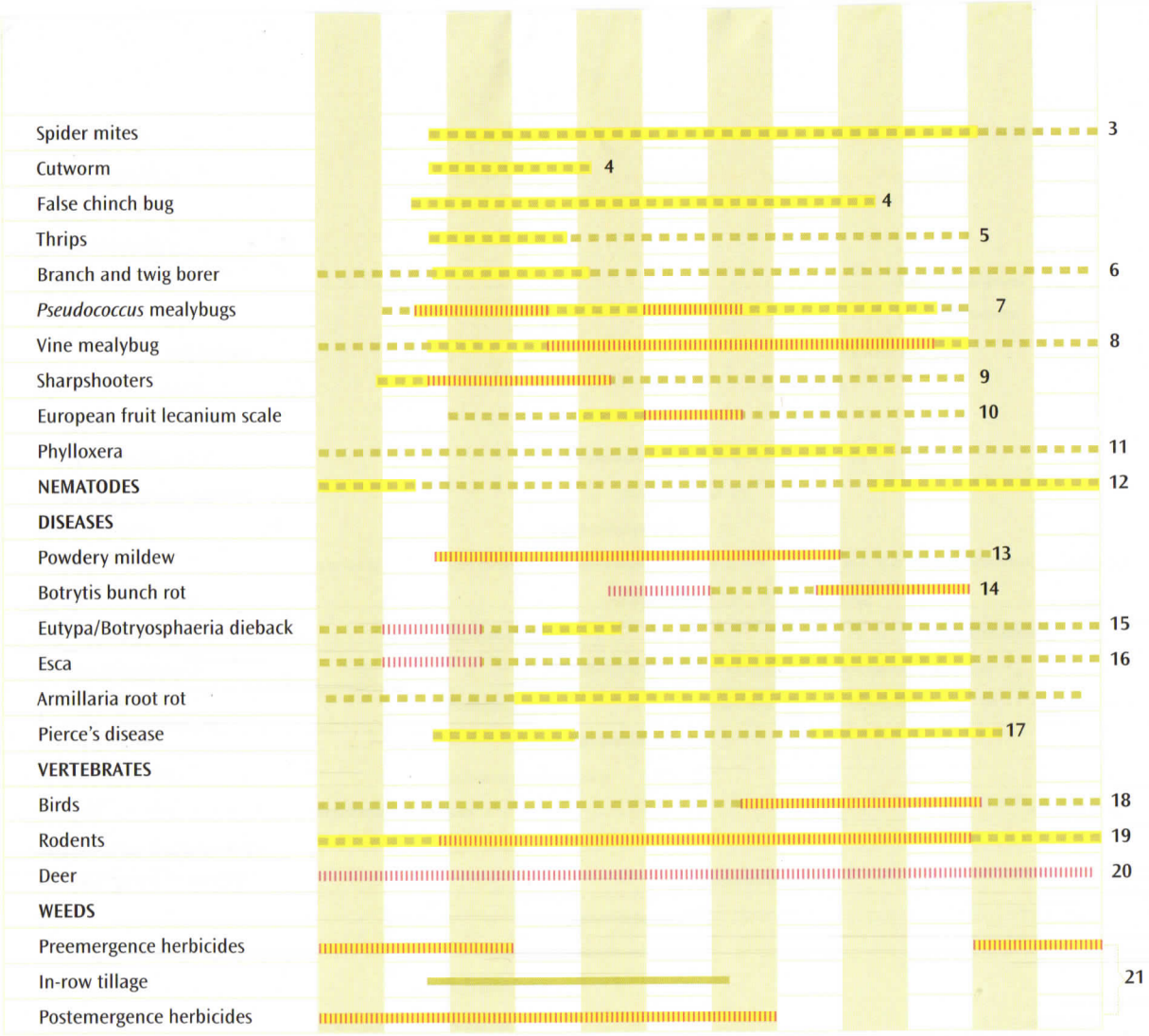
14. Plant cover crops: Plant after harvest if possible, but early enough to have seed germination before the onset of heavy winter rains. Select cover crops for erosion control and/or soil-building characteristics.

PEST MANAGEMENT NOTES: NORTH COAST

Many north coast vineyards seldom require treatment for insect and mite pests, but all vineyards require control measures for disease management. The following pests and diseases may require control in specific years or specific areas of the region:

1. Grape leafhopper: Rarely warrants treatment. To influence treatment decisions, monitor to include *Anagrus* activity (red eggs).

2. Orange tortrix: If Botrytis bunch rot was common the previous year, inspect weeds and leaves near shoot tips prior to bloom. Monitor clusters from bloom to before bunch closure. If treatment is required, complete before bunch closure.



KEY:

- Timing of viticulture operations
- Pest active or symptoms present
- Critical monitoring period
- Preferred timing of control

3. Spider mites: No prescribed treatment time. Treat as necessary, taking into account damage and predacious mite distribution. Populations may be high in May, and again later in the season starting in July.

4. Cutworm, false chinch bug: Spot treatments may be needed.

5. Thrips: Stunted shoots with bronzing in early season prior to bloom indicate damaging thrips populations. Control measures may be needed in cool springs. Damage to shoot tips or leaves in summer rarely warrants treatment.

6. Branch and twig borer: Remove dead wood at pruning and shred. Burn brush or woodpiles before larvae hatch in March. Chemical control is often ineffective.

7. *Pseudococcus* mealybugs: Monitor spurs and canes at budbreak. If possible, prune to reduce contact of ripening clusters with woody parts of vine. Ant control alone may eliminate the need for a treatment directed toward *Pseudococcus* mealybugs. Reduce spread with sanitation practices.

8. Vine mealybug: Use pheromone traps to detect males from June through October. Treat prior to harvest to prevent canopy and cluster infestations at harvest. With severe late-season infestations, take measures that will reduce the spread during harvest activities. Reduce spread with sanitation practices at all times.

9. Sharpshooters: Sharpshooter feeding does not damage vines, but sharpshooters can transmit bacteria that cause Pierce's disease. If Pierce's disease exists in the area, reduce the spring movement of blue-green sharpshooters from overwintering sites into the vineyard using vegetation management. Spot spray adjacent vines to prevent sharpshooter feeding. Use yellow sticky traps starting prior to budbreak to detect movement and to time treatments.

10. European fruit lecanium scale: Moderate to severe infestations occur in some areas. Time treatments after egg hatch of first generation in the spring.

11. Phylloxera: Use resistant rootstocks for control.

12. Nematodes: Preplant fumigation may be necessary. Nematodes are usually not significant pests in most north coast vineyards. However, nematodes of concern include *Xiphinema index,* which transmits grapevine fanleaf virus, and ring nematode.

13. Powdery mildew: Control depends on reducing early-season inoculum and subsequent infection. Monitor and use the UC Davis risk assessment model to determine spray intervals and material selection.

14. Botrytis bunch rot: In susceptible cultivars, make a bloom application, especially if wet conditions are present. In cool, damp growing conditions, an application just prior to bunch closure may be needed. Apply preharvest treatments before rainfall. Removing leaves to expose clusters and thinning clusters to prevent fruit clumping may be beneficial. See 11 and 12 under "Vineyard Management Notes," above.

15. Eutypa/Botryosphaeria dieback: The fungi that cause cankers can be found in most vineyards. If possible prune late (February–March) to reduce susceptibility of pruning wounds to some canker-producing fungi. Treat pruning wounds to prevent infection. See 4 under "Vineyard Management Notes," above.

16. Esca: The fungi that cause these diseases can be found in most vineyards. Spores are released during periods of high moisture and subsequent drying. Spores can enter vines through pruning wounds.

17. Pierce's disease: Removing diseased vines to eliminate sources of bacteria that can be acquired by insect vectors may be effective, depending on vector type and site. Replant vines to maintain production.

18. Birds: Prevent crop loss by netting vines.

19. Rodents: Includes gophers, voles (meadow mice), rabbits, and ground squirrels. Set traps or bait regularly when vine damage occurs. Be sure to identify endangered species in your area prior to trapping or baiting. Exclude rabbits in newly planted vineyards with fencing or vine shelters.

20. Deer: Exclude deer year-round with fencing.

21. Weeds: Time application of most preemergence herbicides before winter rains and seed germination. In high-rainfall areas, preemergence materials may be applied in early spring. Tank mixing with postemergence herbicides may be necessary. Weed size and growth stage affect the efficacy of postemergence herbicides. Mechanical weed control in the vine row is effective when weeds are small and soil moisture is optimal for the device used. Monitor weed species and populations to evaluate the success of weed control strategies.