KEY PESTS, KEY PLANTS, AND KEY LOCATIONS

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The diversity of plants in urban and suburban landscapes has been well documented and tends to be much greater than typical agricultural systems in which most crops consist of a single species or cultivar of plant (3,9,14). Landscapes and golf courses may be composed of several hundred species or cultivars of plants. Frankie and Ehler (4) reported more than 330 species of woody landscape trees, shrubs, and vines found within the city limits of Austin, Texas. In a survey of municipal foresters Kielbaso and Kennedy (6) found more than 200 species or cultivars comprising the urban forest in western cities. A study of 26 homesites in Maryland revealed in excess of 133 species of landscape plants under the management of a single firm (5). This bewildering array of plant material and the associated insect, disease, and weed pests complicate the process of pest management.

The concept of key pests is widely used in traditional agronomic systems to define the focus for management activities. Key pests of landscape plants have also been derived for a variety of geographic regions and management systems. Lists of key pests serve several important purposes. First, they clearly indicate that although the overall pest diversity is large in landscape systems, a rather limited number of insects and mites create the majority of problems. A national survey revealed that a group of ten species or species groups accounted for 75% of the total insect problems encountered by municipal foresters (15). These pests included aphids, gypsy moth, elm leaf beetle, borers, tent caterpillars, scales, bagworm, webworm, and ants. Data gathered from scouting programs in home landscapes disclosed that ten species or functionally related groups accounted for 83 of the arthropod pests encountered annually (12). This list of pests was dominated by lace bugs, mites, scales, borers, leaf miners, Japanese beetle, aphids, bagworms, galls and weevils. Arthropod pests in nurseries appear similarly biased in that a group of ten species or species groups accounted for 88% of the total encountered (13).

Lists of key pests in a geographic region appear relatively stable temporally. Surveys of municipal arborists conducted six years apart yielded lists that were quite similar. In four geographic regions the relative importance of individual pests or pest groups changed somewhat; however, lists shared from 70 to 90 % of their pests between sample dates (15). Not surprisingly, this pattern does not hold across

geographic regions where lists of the ten most common pests share only from 30 to 70 % of their taxa (15). Even within geographic regions lists of key pests vary. The diversity of plants in the management unit will strongly influence the list of associated key pests. The managed landscape of one college campus was dominated by two genera of trees. As a result, a complex of only ten arthropod pests accounted for 97% of all insect and mite pests found (12). In contrast, homeowners in the same area generally had more diverse landscapes and the ten most common arthropod pests accounted for only 83% of the total encountered (12).

In most agronomic systems crops are managed for production based on a unit area such as bushels or pounds per acre. The management unit is usually comprised of many hundreds or thousands of plants and the value of the crop is determined by the aggregate contribution of each plant to the yield. This situation does not exist in most ornamental landscape systems where a single plant may have a value of hundreds or thousands of dollars and an individual plant may be the focus of management activities (2). Furthermore, the floristic diversity of landscapes presents the inexperienced pest manager with a bewildering array of plants and associated pests. Key plants have been defined as those that provide aesthetic or functional attributes that contribute significantly to the landscape value (7). An operational component was later added to this definition that identified key plants as those that were most likely to incur serious, perennial problems that dominate control practices (10). The identification of key plants on a regional or local basis can assist in the design of pest resistant landscapes by indicating which genera are pest prone and should be avoided. Also, for existing landscapes it identifies the genera that will be pest prone and therefore serve as the focus of monitoring and intervention activities. This information is useful in planning the cost of IPM programs by landscape management firms (1,5).

In examining more than 30,000 home landscape plants certain families and genera were found to be much more pest prone than others (11). For example, plants in the genus Malus represented from 2.1 to 3.1 % of the total plants monitored in four experimental IPM programs. However , the likelihood that any plant in this genus would have a pest or cultural problem ranged from 47 to 100 %. Other genera of plants such as Viburnum were relatively pest free. In general, rosaceous plants tended to be widely used and among the most pest prone in homeowner landscapes (11). Similar lists of key plants have been generated by monitoring home landscapes in Minnesota (1) and by surveying municipal arborists and foresters in several midwestern cities (18).

The concepts of key pests and key plants can be used to focus monitoring and intervention activities in landscapes, golf courses, and turf farms. Another concept called key location can also be used to make monitoring, decision-making, and intervention more efficient and effective. The concept of key locations was first described to me by Drs. Michael Villani and J. Lee Hellman of Cornell University and the University of Maryland, respectively. These researchers studied the occurrence of pests in turfgrasses on golf courses, turf farms and homeowner's lawns. They found that certain sites or locations were more likely than others to be infested by pests first, frequently, or severely year after year. They called these sites key locations and suggested that monitoring activities should be directed at these locations once they had been identified in the landscape. Key locations also occur for woody landscape plants. For example, azaleas planted in sunny, exposed locations are much more likely to be infested by lace bugs than those planted in shady locations (10). Therefore, full sun is a key location for azaleas and azaleas planted in exposed sites should be monitored frequently due to a greater risk of lace bug attack. The concept of key locations has further implications with respect to landscape design. As we begin to identify key locations for different species and cultivars of landscape plants and turfgrasses, we can avoid designing susceptible plants into risky locations. Careful matching of the proper plant with the correct planting site can greatly reduce the long term material and labor costs associated with landscape maintenance.

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