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## Plant Health in Private Urban Gardens

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**Abstract:** Private garden plots present a vast area for growing plants for food or enjoyment. The Royal Botanic Garden Edinburgh provides a plant identification and advisory service to the public. This includes a service to advise on plant health problems, which is not advertised. In the past 17 years a moderate number of individuals made use of this service, with an average of 67 enquiries and some 100 specimens per year. Relevant data from the enquiries were entered into a database and analysed. The majority of enquiries concerned tree problems, followed by ornamental and fruit plant problems. Fungi ranked highest, with arthropod pests and physiological conditions coming second and third, respectively. Cultural control was most frequently recommended, followed by chemical control and integrated approaches. No control was necessary or possible in 22% of cases.

**Key Words:** Urban gardening, plant pathology

### Introduction

In the UK urban environment there are an estimated 200 private garden plots per 1000 population. Estimates for other western countries are similar. Data for countries in Eastern Europe, Asia, and developing regions are not yet available. However, judging from satellite images (such as GoogleMaps™) it can be seen that private gardens in urban areas are also important features in South-West Asia. These plots serve mainly as recreational areas, but to some extent they are also used for the cultivation of fruit and vegetables, and their importance for the provision of a wide range of horticultural crops should not be underestimated. This is especially true in poor economies (van Bruggen, personal communication). Helfer (2005) published a preliminary account for Scottish gardens.

Private garden plots represent an exceptional diversity of physical and chemical growing conditions, edaphic factors, and biological environments. Furthermore, the diversity of plants grown in these gardens is remarkable, being largely dependent on such factors as fashions and trends, personal choice, and availability of planting material from garden suppliers or friends and neighbours,

rather than suitability of a particular plant to the growing conditions on site.

This diversity is mirrored by the variety of plant health problems that can affect private garden plots. However, to date there are no conclusive data or surveys that could show the state of health of private urban gardens, and any conclusions drawn in this paper are on the basis of information volunteered by (a small section of) the public, seeking advice on plant health issues.

### Materials and Methods

The data were gained from the advice service the Royal Botanic Garden Edinburgh provides to the public. Additional data obtained by the Royal Horticultural Society were included and compared. The data were analysed for plant category, problem cause, advice given, and month of problem occurrence.

### Results and Discussion

1) "Problem" plant categories: Figure 1 shows the distribution of plant categories encountered during the past 17 years. In my opinion, this does not reflect the

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prevalence of problems inherent to these plants. It merely shows which plant types are causing most concern to private gardeners. The prominent position of trees can therefore be attributed to their size and longevity and people’s concern about the consequences of there being a serious problem with them (see also chapter 11 in Ingram & Robertson, 1999). The almost total absence of vegetables from these data may reflect the fact that not many gardeners in Scotland now grow vegetables, and that the Royal Botanic Garden is not known for its expertise in vegetable matters. Interestingly, data from the Royal Horticultural Society are very similar in this respect (Dr Chris Prior, personal communication).

2) Plant problem categories: Plant ill health may be caused by 2 main categories: abiotic factors and biotic agents. The former includes the basic physical and chemical conditions such as lack or excess of light, frost, drought or water logging, and also chemical toxicity and nutrient deficiencies or imbalances. The latter includes problems caused by disease and pest organisms such as aphids, mildews, bacteria, and viruses. Added to these can be problems related to unsuitable horticultural care (e.g., the incorrect application of pesticides or inappropriate pruning or mulching). Often the apparent ill health of plants is due to factors in both categories, and a plant growing vigorously in the most suitable environment is far less likely to contract biotic diseases, let alone

succumb to them. Conversely, what starts as a minor environmental problem may end up in a plant killed by pathogens.

The data show that plant problems most often encountered in private gardens are caused by fungi (Figure 2). This is not altogether surprising as 70% of plant diseases worldwide are caused by these organisms (Kendrick, 2003). The rusts (Uredinales, Figure 3) and powdery mildews (Erysiphales) are strongly represented here, as are lawn fungi, the dreaded honey fungus *Armillaria* and *Phytophthora* dieback. The relatively low count for pests can probably be explained by the fact that most gardeners can recognise slugs and aphids, and do not need to ask for expert identifications for these organisms. From personal experience with slugs, snails, and sawfly the author would have expected that these pests would top the problem causes. Physiological problems such as drought, frost, or nutrient imbalance are next highest in the problem category, followed by bacterial problems (mainly bacterial canker and Fire Blight, caused by *Erwinia amylovora*). The remaining problem causes are relatively rare, with cultural malpractice being responsible for almost 6% of the troubles.

3) Advice on control strategies: What can a gardener do when a plant health problem strikes? There are a number of places where help is on offer. Firstly the

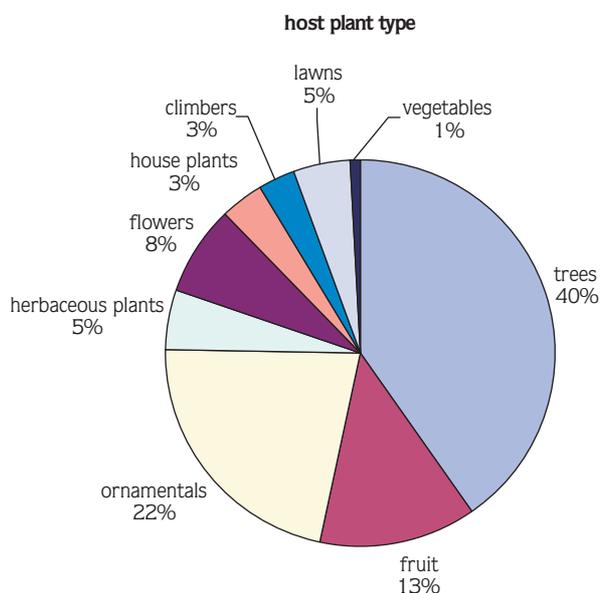


Figure 1. Categories of plants for which advice is sought.

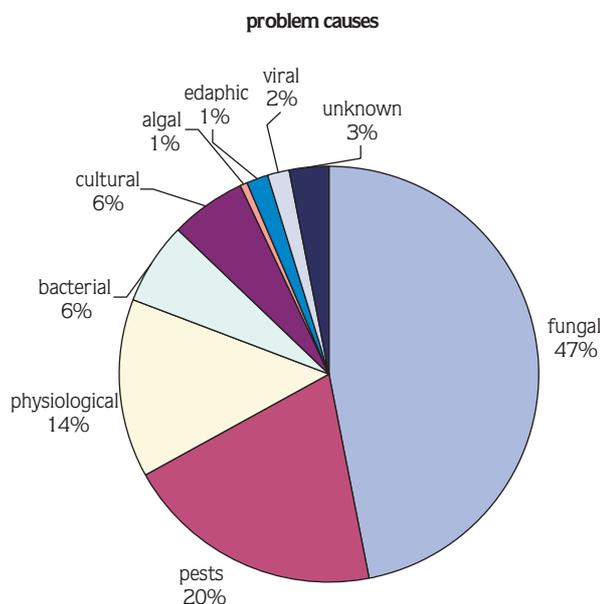


Figure 2. Problem causes by category.



Figure 3. *Phragmidium rosae-pimpinellifoliae* Dietel, a common pathogen of roses.

supplier should be willing to offer advice, and if necessary replace any plants that were sold unfit. Television and radio programmes offer popular gardening advice, and

the gardening magazines provide regular “problem pages” for their readers. For the more committed garden enthusiast in the United Kingdom the Royal Horticultural Society provides both problem identification and advice and more general horticultural guidance to members (see <http://www.rhs.org.uk>). Institutions such as the Royal Botanic Garden Edinburgh (<http://www.rbge.org.uk>) also provide advice. In the USA and Canada a popular programme of Master Gardeners (Chalker-Scott & Collman, 2006) provides volunteer advice to the public. There are also many good books available (Mikolajski, 2004; e.g., Buczacki & Harris, 2005).

There is a seasonal aspect to plant pathology, in that many plant problems occur during particular growth phases of the plant. For instance, the peach leaf curl (caused by *Taphrina deformans* (Berk.) Tul.) is almost always restricted to the first flush of leaves in peaches, almonds, and nectarines (see also Giosuè et al., 2000). It would most likely be seen around mid May, bringing about distorted, discoloured (red to purple) leaves (Figure 4) that drop prematurely. Normally this drop is followed by a new flush of leaves, which are entirely healthy. Similarly, the fire blight (caused by *Erwinia amylovora*) normally attacks plants only after a warm spell shortly after the trees (apple, pear, cotoneaster, and the like) have flowered (April-May) (Thomson & Gouk, 2003). The fruiting bodies of many fleshy fungi (such as *Armillaria* spp. or *Marasmius*) only are seen towards the end of summer; however, the fungi, often unseen as microscopic



Figure 4. *Taphrina pruni* on *Prunus smithii*.

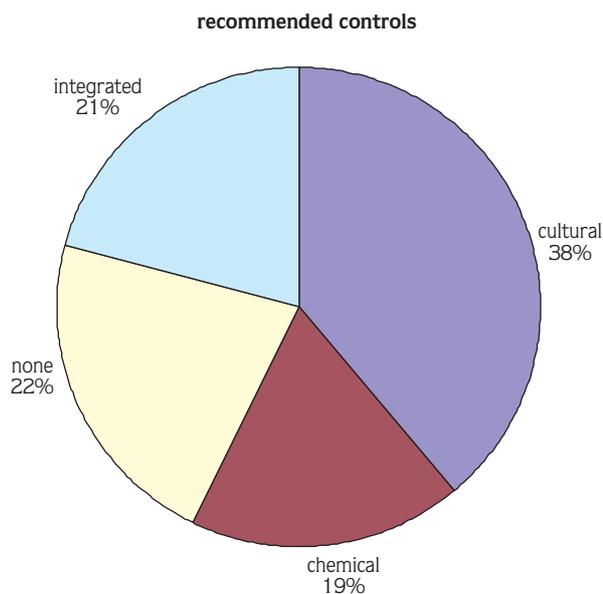


Figure 5. Control methods recommended.

threads (mycelium), are present and cause damage during the whole year.

Our advice is normally balanced between the attempt to stay “chemical free” and the availability and effectiveness of alternative control methods. Some enquirers specify what methods would be acceptable to them, while others are anxious for any advice available. Figure 5 shows the distribution of advice given by us concerning control methods. In almost of cases the advice is to simply wait and do nothing. Some 38% of the cases required cultural control methods and in 19% of

the cases chemical control was considered most appropriate. It is important to follow official recommendations on the use of pesticides such as up-to-date publications from the Pesticide Safety Directorate (2007) and equivalent legislation elsewhere. The remaining 22% of problems called for an integrated method, requiring some chemicals combined with cultural control methods. Many plant problems can be controlled or substantially reduced by horticultural methods, such as judicious pruning, hygiene, or the use of mulches and fertilisers. There could also be cases where more radical methods are called for, such as the moving of a plant to a more suitable environment or the destruction and burning of a plant, presenting a risk to other plants, people, or property. As with many troubles, much harm can be avoided if the problem cause is diagnosed in its initial stages. All this requires a certain amount of knowledge, and, most importantly, vigilance.

### Conclusions

Plant health issues are important for all gardens and gardeners. There is currently a lack of information on basic data concerning plant health problems in private gardens, despite their obvious appreciation in urban landscapes and their value for the quality of life in urban and sub-urban areas. Trees cause greatest concern in plant health enquiries, and fungi rank highest as organisms causing ill health in plants. Further research, especially involving random surveys, would be helpful in scientifically assessing the full impact of plant health issues on private gardens.

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