Crop specific guidance – Ware and Seed Potatoes

The IPM Tool allows you to prioritise pests that are important on your farm. This helps guide decisions on which IPM measures are appropriate. Implementing IPM can result in 'trade-offs' where methods to control one pest may increase another. Some of these trade-offs are included in the notes below and in the Tool. Prioritising pests will help decide which pests are most important where there are trade-offs. This guidance documents provides advice on IPM measures for potato insect pests and diseases. For information on IPM interventions for weeds, refer to the separate IPM Weeds guidance document.

Insect Pests

Insect pests cause damage to the crop either through direct feeding or through the transmission of viruses during feeding, although in some instances the presence of some damage will not necessarily impact on marketable yield. Non-chemical control methods are unlikely to be 100% effective, but they do reduce the requirement for chemical control. Combinations of one or more IPM techniques are likely to be most effective.

Select low risk locations / Soil analysis for pests

This is essential for planning control of free living nematodes (FLN), potato cyst nematodes (PCN) and wireworms. Soil analysis will detect stubby root nematodes which are the vectors of tobacco rattle virus (TRV) that causes spraing. It will also establish the level of PCN infestation and the species present. In most cases this is white PCN (*Globodera pallida*) rather than yellow PCN (*G. rostochiensis*). If land is intended for seed potato production, it is mandatory to have the field sampled and tested for PCN. If the field is for ware potato, there is no compulsory test, but an infestation can only be managed once you know PCN is present and therefore soil sampling is beneficial.

Soil analysis will only detect wireworm numbers down to 60,000/ha but crop damage is still possible at levels below this. Land with wireworms and high numbers of FLN and PCN is best avoided for potatoes. The level of aphid infestation is related to the altitude at which the crop is grown. The higher the altitude the lower the risk of aphid infestation.

Field History, Rotation & Break crops

Potatoes ideally should not be grown following long term grass leys to minimise the risk of wireworm infestation. Rotation is vital to limit the reproduction of PCN. Where the pest is present, potatoes should not be grown more than one year in eight. The growing of seed potatoes is only permitted on land that is free from PCN.

Spatial separation

The main virus of concern for seed potato growers and industry is Potato Virus Y (PVY), which is transmitted by aphids, principally *Myzus persicae*, during July and August. As aphids are not thought to carry the virus over long distances, current guidance for PVY management recommends high grade seed crops to be isolated and away from fields with volunteers and to plant away from fields where volunteers have not been controlled.

Control Volunteers & Weeds

Volunteer potatoes can act as hosts or reservoirs for PCN, cutworms and aphids/aphid-borne viruses. Control of volunteer potatoes are unlikely to have a significant effect where PCN infestations are high but may help to maintain infestations at a low level from one crop to the next.

In field non-cropped areas / Beetle banks / Diverse crop margins or strips

Beetle banks consist of stands of wildflowers and grasses and are designed to act as reservoirs of beneficial insects such as ground beetles and parasitoids, which help to provide natural biological control of insect pests.

Diverse crop margins and strips act in a similar way to beetle banks to increase natural enemies. However, some of the plant species could benefit pests. More diverse strips should harbour greater biodiversity and greater numbers of beneficials. Ladybirds, hoverflies and lacewings are natural enemies of aphid in potato.

Variety choice

Potato varieties are available with resistance to the yellow PCN (*Globodera rostochiensis*) although this is the least common PCN species of PCN in the UK. A smaller range of varieties are resistant to the more common white PCN (*G. pallida*). Some varieties also show tolerance to PCN which means they yield well in the presence of PCN but allow PCN reproduction.

Primary Cultivations / Crop residue burial

The mechanical action of cultivations can reduce soil populations of wireworms. The pests can be killed or brought to the surface where they are eaten by birds or die due to dehydration. Undisturbed trash or crop residue can provide shelter and food for pests such as slugs, and should be buried below the soil surface through cultivations. On the negative side additional cultivations increase your carbon footprint and can reduce soil biodiversity.

Secondary Cultivations / Seedbed quality

Cloddy seed beds can allow slugs access to developing potato tubers. The mechanical action of cultivations can produce finer seed beds and reduce slug risk.

Trap cropping

Trap cropping involves growing Solanum species eg Solanum sisymbrifolium which stimulate PCN hatch but limit PCN reproduction. Problems can exist with establishing trap crops and fitting this in with potato rotations.

Biofumigation

Biofumigation is the suppression of soilborne pests by toxic gases emitted from organic material. It has been used for PCN control although results are varied. This involves growing brassica green manure crops which are then macerated and incorporated as they reach early to mid-flowering. Most common species planted are Indian mustard (*Brassica juncea*), rocket (*Eruca sativa*) and oil radish (*Raphanus sativus*). They have a growing period of 8 – 14 weeks within a mid-July to early November window.

Hygiene

Outgrade piles are an important source of aphid-borne viruses in potato. Controlling haulm growth on dumps or covering the dumps is an essential part of the national guidance for virus management. Small quantities of tubers discarded on fields can have the same impact, particularly when in close proximity to the current crop. Early sources of virus should be removed before they can contribute to spread.

PCN can infect clean land via infected soil, so machinery used on infested fields should be power-washed before use in uninfected fields. Clean fields should be visited first in the sequence of crops so that cleaning down equipment can be done at the end of the day.

Controlled irrigation

This is primarily used for cutworm control. Irrigation can be used as a substitute for insecticides to wash cutworms from the foliage after which they cannot re-climb the plant. Cutworms must be controlled before they leave the foliage and burrow below ground.

Early harvest (after skin set)

This may be useful in the presence of wireworm or PCN infestation. Early harvest will limit further damage and also reduce the potential for PCN reproduction. Potato crops must be harvested after skin set.

Seed Testing

Potato seed production in the UK is undertaken under the strict regulation of the Seed Potato Classification Scheme, which ensures that seed potatoes are guaranteed to be free from a range of pests and diseases, including potato cyst nematode. All potatoes grown for seed production must be certified before marketing. Only certified potato seed can be used for the planting of new crops.

Decision Support / Monitoring techniques

Monitoring is an essential component of pest management. This can involve visual inspection of the crop or a trap-based system (eg water traps, sticky traps or pheromone traps). Pest numbers are related to thresholds and a treatment decision is made using this information. To monitor for cutworm risk, pheromone traps are available for the turnip moth. Use of traps can help to determine if irrigation/insecticides are justified as control measures.

Planning pest control strategy

Planning the optimum non-chemical strategy for managing each pest can help to avoid inappropriate use of pesticides. Previous records of pest damage are very useful to help predict the likely timing of pest attack. Records should also be kept of the success of non-chemical pest control strategies.

Diseases

The majority of potato diseases are either soil or seed borne. The two significant leaf diseases are late blight (*Phytophthora infestans*) and early blight (*Alternaria*). The key to integrated control of potato blight is to avoid it getting into the crop in the first place, through management of volunteers and waste potato dumps.

Field History, Rotation & Break crops

If a field has a history of a certain disease it is likely that this will return as a problem in the future, either through survival in the soil, on the soil surface or via the 'green bridge', where plants from the previous season are infected with a disease or virus vector. Knowledge of field history allows steps to be taken to minimise risks. Crop rotation limits the build-up of many soil borne disease. It also allows an opportunity to control potato volunteers which can act as a reservoir of disease.

Select low risk locations / Spatial separation

Control volunteers before sowing and avoid sowing next year's crops adjacent to fields with potato volunteers. Proximity to gardens and allotments can increase the risk, as home-grown potatoes can act as reservoirs of infection.

Good drainage

Wet areas and fields subject to flooding are likely to be more prone to diseases not only because of poor plant growth but also because some pathogens are adapted to conditions of high soil moisture. Soil nutrient deficiencies, adverse seed bed conditions and poor drainage are likely to predispose plants to disease.

Control volunteers & weeds

Potato volunteers are most significant as a 'green bridge' for late blight and, if untreated with fungicide, a massive reservoir of inoculum. Ideally the volunteers should be destroyed prior to the emergence of new crops. Certain weed species, such as shepherd's purse, can act as alternative hosts for tobacco rattle virus which causes spraing in potatoes.

Primary Cultivations / Crop residue burial

For late blight, soils should be cultivated deep enough to ensure there is sufficient tilth to adequately cover the tubers to decrease the risk from tuber blight. Cultivations that manage weed populations, bury overwintering crop debris and reduce volunteers can substantially decrease disease risk.

Planting Date

Planting earlier in the growing season mean crops are harvested before late blight increases. Planting early in the season can mean cold and wet weather and slower emergence which increases the risk of stem canker. Seed tubers should be planted when soil conditions are warmer and drier.

Appropriate Harvest

Delaying harvest after desiccation can increase disease incidence on tubers. Black Dot is known to be more severe when harvest is delayed. Similarly, delayed harvest has been associated with increased incidence of silver scurf and black scurf. The downside to earlier harvest is that skins may not be set,

making long-term storage challenging. For blackleg, lifting early in dry conditions once skin set complete is recommended and this will help to prevent the development of other tuber diseases. Crops should not be lifted until at least 14 days after the haulm is dead following desiccation to minimise tuber blight infection.

Hygiene

This is the first defence against the introduction of soil-borne diseases onto clean land. Machinery used in infested fields should be power-washed before use in uninfected fields, and soil should be knocked off from boots and tools. Clean fields should be visited first in the sequence of crops so that cleaning down equipment can be done at the end of the day. Outgrade and waste piles act as a reservoir of late blight. Black sheeting or glyphosate should be used to achieve a zero tolerance of shoot or foliage production. For blackleg, it is recommended that rots are removed early when grading and grading equipment is cleaned if there were obvious signs of rots in a previously graded stock.

Varietal choice / Resistant varieties

Resistant varieties are an important part of non-chemical disease control. There are good sources of information on disease resistance to many of the major pathogens in the potato variety database. https://potatoes.agricrops.org/

Seedbed quality

Adverse soil seed bed conditions are likely to predispose plants to disease, planting should be delayed if conditions are poor for crop establishment. Poor seed bed quality can increase the risk of tuber blight if there is not adequate soil coverage of the tubers.

Seed testing

The use of certified seed can help ensure that heavily infected seed stocks are not used and can be an effective approach to preventing notifiable diseases and reducing the risk from other diseases.

Nutrient management / Avoid excessive N application

Excessive nitrogen will exacerbate diseases which thrive in a dense lush canopy. Crops which are nutrient deficient are likely to be predisposed to disease infection. Ensure appropriate soil nutrient supply by regular soil sampling and testing and use of appropriate fertilisers.

Decision Support Tools (including thresholds)

Late blight forecasts and monitoring are available from commercial and public sources. Fight Against Blight | The James Hutton Institute

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