



## Guidelines for potato tuber application equipment

### 1. Objectives

- To optimise the efficacy of the application equipment currently available.
- To ensure that application occurs with minimal risk to workers and the environment.
- To identify strengths and weaknesses of the various application systems.
- To identify key areas for development which will enhance tuber treatment.

### 2. Recommendations based on current knowledge

Evaluate the treatment need (ware/seed) and plan the line accordingly. Separate seed and ware systems may be required to cater for differences in throughput and tuber size.

#### Ware/seed:

For high tonnage systems (20-60 t/hr) consider using the “drop” method on a conveyor/elevator.

- For high tonnage up to 20 t/hr roller tables or conveyors can be used.
- The treatment site should be near the box or bulk stack; but do not site sprayers on the end of the elevator going onto a stack.
- In most situations a low volume hydraulic treatment system is the preferred application equipment.

#### Seed:

- Roller tables are the preferred method of tuber presentation. Select roller size and pitch for the size of tuber i.e. 5 mm greater than largest tuber. See *Growers' Advice 'The improved targeting of sprays onto potatoes on roller tables'*. Both spinning disc and hydraulic machines can be considered.

#### General considerations:

- Tubers must be rotating at the site of application to achieve good coverage.
- Evidence indicates that higher water volumes (seed 1-3 l/t, ware 1-2 l/t) give better coverage, adhesion and “deposit”.
- All treatment areas should be enclosed to prevent drift of spray mist.
- Drip trays should be situated below the treatment site to catch waste chemical.
- It should be possible to stop all machinery on the line via one switch in case of emergency.

### 3. Key considerations when setting up application equipment for the treatment of ware/seed potatoes

- What is anticipated throughput in tonnes/hour?
- Can all parts of the line handle the throughput?
- Can a constant throughput be maintained?
- Where a roller table is used, are the feed belt and the table of the same width?
- Can the treatment table be consistently filled across its width?
- Will the applicator deliver the desired output and maintain an effective spray pattern? See *Growers' Advice 'Spray pattern check for tuber treatments'*.
- Will treatment be applied immediately before tubers enter their final container?
- Where will the treatment area be situated relative to the storage boxes/stack and workers?
- If a conveyor/elevator system is used, is the “drop” great enough to achieve coverage while small enough to minimise damage?
- In the event of an emergency, can the line be shut down from one place?
- Does the application system have an automatic cut-off to stop the applicator if tuber flow ceases?
- What action has been taken to prevent accidental contamination of the environment and the exposure of workers to spray drift?
- Does/do my operator(s) have an NPTC PA12 certificate?

### 4. Options for potato tuber treatment

#### Elevators/conveyors – ware

##### Pros

- Can handle very large throughputs
- Can achieve good chemical “deposit”
- Crop falls through a spray mist
- Nozzles targeting tubers from various angles- can achieve good coverage
- Inexpensive system which can almost always be fitted into a line

##### Cons

- Difficult to monitor spray effectiveness
- Easy to overload and therefore reduce effectiveness
- “Drop” can cause tuber damage
- Need multiple nozzles/angles to achieve good coverage

#### Roller tables – seed tubers

##### Pros

- Can provide controlled tuber rotation
- Can fit in with most lines throughputs
- Can see when correctly loaded with tubers
- Can achieve good coverage

##### Cons

- Must be wide to cope with large throughputs
- Equipment can be expensive

## 5. Options for potato tuber spraying equipment

### “Spinning disc”

#### Pros

- Can be effective for treatment of low seed throughputs
- Electrostatic charging of the spray can achieve high “deposits” of pesticide
- Can be used to apply more viscous pesticide formulations which will not spray satisfactorily through hydraulic nozzles

#### Cons

- Need multiple discs for high throughputs and higher application volumes
- Less reliable than hydraulic systems
- Agitation systems usually not available
- Low volumes can compromise disease control – poor penetration to the tuber skin
- Cannot always see spray or deposit

### Hydraulic nozzles

#### Pros

- Can treat high throughput situations
- Tried tested, simple technology
- Greater water volumes can aid control of diseases by penetration to tuber skin
- Can see spray and deposit

#### Cons

- Small nozzles can be prone to blockage
- Over wetting can lead to the spread of bacterial rots
- Poor setting up and control can lead to localised overwetting

## 6. New developments required

- Development of “buffered” systems to control the flow of potatoes through the treatment area. This will allow greater accuracy of application.
- Automated record keeping to how quantity of product used and tonnage treated.
- Automated fault detection system to prevent over and under treatment of tubers.
- Evaluation of the benefits of size grading/cleaning prior to chemical treatment.
- Objective evaluation of the pros/cons of different tuber presentation systems.
- Evaluation of the optimum nozzle type and spray patterns.
- The potential value of wetters/spreaders in allowing larger bore nozzles to be used.
- Evaluation of multiple spinning discs for high volume and co-application of chemicals.

## 7. Conclusions

To achieve the best results from the currently available equipment growers/users must select systems appropriate to their requirements. The principle consideration is the throughput of the system and whether ware or seed is being treated.

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