

**danfoil** *production a/s*

# INSTRUCTIONS

*Congratulations on choosing  
a **danfoil** sprayer !*

In order for you to benefit fully from your new sprayer, please acquaint yourself with the construction, the function and the adjustments of the sprayer.

Therefore, please study this manual carefully before you start using your new sprayer. It is imperative, also to study the part of the manual concerning the installed monitor.



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# **1. Machine Data**

## **1.1 Machine Data on your new *danfoil* Sprayer**

## 2. Description of the Sprayer

### 2.1 Application

The **danfoil** sprayer is designed especially for the spraying of agricultural and horticultural crops. The sprayer is also very suitable for spraying in forest and christmas tree plantations, nurseries, orchards and other particular plantations.

The sprayer is developed for the spraying of all conventional spraying liquids at an extremely low level of liquid consumption. The application rate is normally 30-40 litres per hectare compared to traditionally 150-400 litres per hectare. At normal speed, the application rate does not exceed approx. 120 litres per hectare. For a number of spraying tasks, the concentration of pesticides can be reduced notably compared to the concentration of a normal sprayer, while still achieving the same effect.

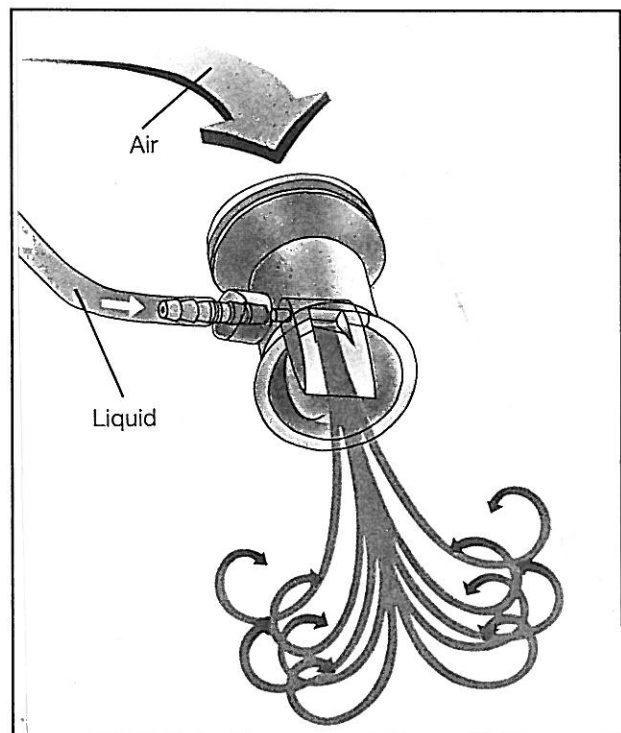
### 2.2 The Construction of the **danfoil** Sprayer

The **danfoil B3/B5** sprayer is available for working widths from 12 to 24 metres, and it is constructed on a sturdy frame mounted on the three-point linkage of the tractor. The frame carries the tank, the pump, the air fan, the fittings and the spraying boom. Furthermore, it is possible to mount a clean-water tank on the frame and pesticide induction unit can be delivered as accessory.

The tank contains 850 litres and is made of plastic. The pump is a piston diaphragm pump with three chambers. From the pump, the spraying liquid is led through a filter and a flowmeter to 3-5 motorised valves, which supply the patented **danfoil** atomizers situated in the boom section.

The atomizer mixes air and spraying liquid. The liquid is led into the side of the atomizer at low pressure, where it slides down the side of the vertically placed foil. Air is forced through the atomizer at high speed, sweeping the liquid away and blowing it into the crops. The atomization happens when the liquid is swept off the sharp trailing edge.

The pump and the fan are driven by a V-belt pull connected to the power take-off of the tractor. Hydraulic operation of the pump is delivered



as accessory. Through an armoured hose, the air is led out into the conical boom made of fibre glass. This material makes it light, strong and stable. As additional security, the boom is secured to a pendulum suspension, which is stabilized by springs and shock absorbers. The position of the boom can be fine adjusted using a tilt ram (std B5). The height adjustment and the open and closing of the side booms is regulated hydraulically by using the hydraulic lever in the tractor B3 or the switch box B5. The side booms should be folded along side of the tractor for transport.

### 3. Setting-up & Maintenance of the Sprayer

#### 3.1 Mounting on the Tractor

The sprayer is mounted on the three-point linkage of the tractor. Next, the length of the lever arms and the adjustable top link of the tractor are adjusted, allowing the sprayer to be level when held in its working position - both seen from behind and from the side. Then mount:

- The PTO shaft (check the length).
- The hydraulic hoses, 1 single- and 1 double-acting (B3).  
1 double-acting or single acting with return run (B5).  
*Please note, that the thick hose is return.*
- The electrical plug.

***When attaching and detaching the PTO shaft, the engine of the tractor must be turned off by pulling the stop button and removing the key from the ignition lock.***

***It is extremely important for your personal safety, that the safety hoses, the chains and the safety funnels at the end of the PTO shaft are intact. It is also imperative that the hoses do not rotate with the shaft.***

***When uncoupled, the PTO shaft should be placed in the bracker made for the purpose or detached and stored properly (not on the ground).***

The stabilizing chains are tightened in order to keep the sprayer stable in its working position. The supporting legs are pushed up. In order to achieve a sufficient air pressure from the blower when spraying high crops, a minimum of 1000 r.p.m. is required of the power take-off shaft of the tractor.



*It is important to ensure that the statutory weight distribution on the tractor is respected (e.g. by mounting frontal weights). The sprayer is constructed with the centre of gravity as close to the tractor as possible. This leaves little space for coupling and uncoupling, for which reason utmost caution must be shown.*

When operating the liquid pump hydraulically, the flow control must be adjusted (scale 1-10) allowing the pump to run at a maximum speed of 540 r.p.m. when driving in the field at maximum motor revolution.

### 3.2 Setting-up & Control of the Sprayer

*For each inspection, lubrication and for maintenance, the sprayer should be placed on the supporting legs and situated on a firm foundation (e.g. over a lubrication pit). The engine of the tractor must be turned off by pulling the stop button and removing the key from the ignition lock.*

The sprayer is lubricated (consult diagram 3.3).

Check the V-belt drive for pump and blower. The belts must be adequately tight. The belts for the pump are tightened by loosening the four bolts that retain the pump to the pump console. Then the pump console can be adjusted using the adjustment bolt. After tightening, the four bolts are tightened again.

The belts for the blower are tightened by adjusting the bearing suspensions for the power take-off shaft.

*Before starting the sprayer, it is important to ensure that all guards are in place and intact.*

Check the oil-level of the pump (if needed, please replenish using ordinary motor oil).

Check all hydraulic functions (raising- lowering, folding- unfolding, tilting).

***N.B. The pendulum suspension must be balanced when the boom is folded and unfolded.***

Before raising and lowering the boom, the air supply to the boom must be opened in order to straighten the air hose. This will prolong the life span of the hose.

Tighten the wires that carry the booms, positioning all atomizers on a straight line in working position.

Adjust the outer swivel joints and hook-locks in order to make functions correct (B5).

During transportation the booms should be positioned safely into the transport brackets. However, the booms weight should never hang in the brackets.

*When operating the boom, it is important that persons and other objects that may be harmed by the boom, are not within the working area of it.*

Start the blower with the boom in unfolded position. The air hose must be positioned correctly, with no bends. Check the air valve at high and low air pressure. The air valve should always be shut, if the blower is operating with the boom in transport position.

Make sure, that the air hose and the swivel joints have no leaks.

There must be a loop on the hose for the air manometer in order to prevent condensation water from running into the manometer. Any condensation water in the hose must be drained off.

Check the atomizers and make sure that they are clean and free of debris. The blade inside the atomizer must have a sharp edge. If it does not, please replace it. Check that the anti drips are functioning correctly.

### 3.3 Plan for Lubrication & Maintenance

		Daily	Weekly	Yearly
<b>Blower</b>	Check of V-belts	x		
<b>Pump</b>	Check of V-belts	x		
	Check of oil-level	x		
	Change of oil (ordinary motor oil) Check and possibly change of wearing parts			x x
<b>Air vessel</b>	Check of air pressure (approx. 1.0 kilograms/sq. cm)			x
<b>Accessories</b>	Cleaning and check of filter Calibration of flowmeter	x a)		x
<b>Boom</b>	Check of atomizers (both air & liquid)	xa)		
<b>Lubrication</b>	PTO shaft	x		
	Main shaft bearings		x	
	Blower bearing		x	
	Swivel joints & cylinders Pendulum suspension Slide for the boom suspension	x x	x	

a) When needed/ at change of chemicals

## 4. Before Spraying

### 4.1 Water filling

Normally, the water is poured into the tank through the big filling hole at the top of the tank either from a water tank or directly from a water hose.

*Please note, that the water hose must be equipped with a nonreturn valve.*

It is also possible to let the pump draw water into the tank of the sprayer through the suction hose under the foot board. In such case, the rear three-way-tap (no. 6 fig. 2) must be turned 180°.

*Only water from the water main is recommended.*

### 4.2 Check of Liquid Functions of the Sprayer

*After filling water into the tank of the sprayer all the liquid functions of the sprayer must be tested and checked before filling with pesticides.*

*The suction and pressure filter* is cleaned and checked. Some sediments can be flushed out through the bottom tap.

The union nut should only be tightened manually. If that is not sufficient, please check that the gaskets are OK (grease if necessary).

*The air valve* for the blower should be **shut completely**.

*The two taps* (no. 5 & no. 6 fig. 2) under the foot board are opened with the direction indicators pointing towards each other, leading the water from the tank into the pump.

*The pump and the blower* are started.

*The main tap* is closed (scale 0) in order to avoid the liquid from the pump to pass through the filter. Instead, the liquid flows directly to the bottom of the tank for agitating.

Make sure that *the agitating jet* in the bottom of the tank is functioning.

*The main tap* is opened (e.g. scale 5-8), and the filter, the hoses and the hose clamps are checked to make sure that they are tight.

*The regulating valve* is operated. Please check, that the liquid flow in this return hose to the tank top varies depending on the position of the motor valve.

*The motorised valves* are operated together and one by one, thus controlling the flow of liquid to the individual section on and off.



The liquid flow from the atomizers is checked and at least once a year it is measured to ensure the quantity for each atomizer is exactly the same by using a graduated glass.

The small jet on the side of the atomizer must point in the right direction - *the small hole* must point *away from the atomizer*.

*The air valve* is opened and the spraying is checked. Make sure that no debris (paper or leaves) is stuck in the atomizers.

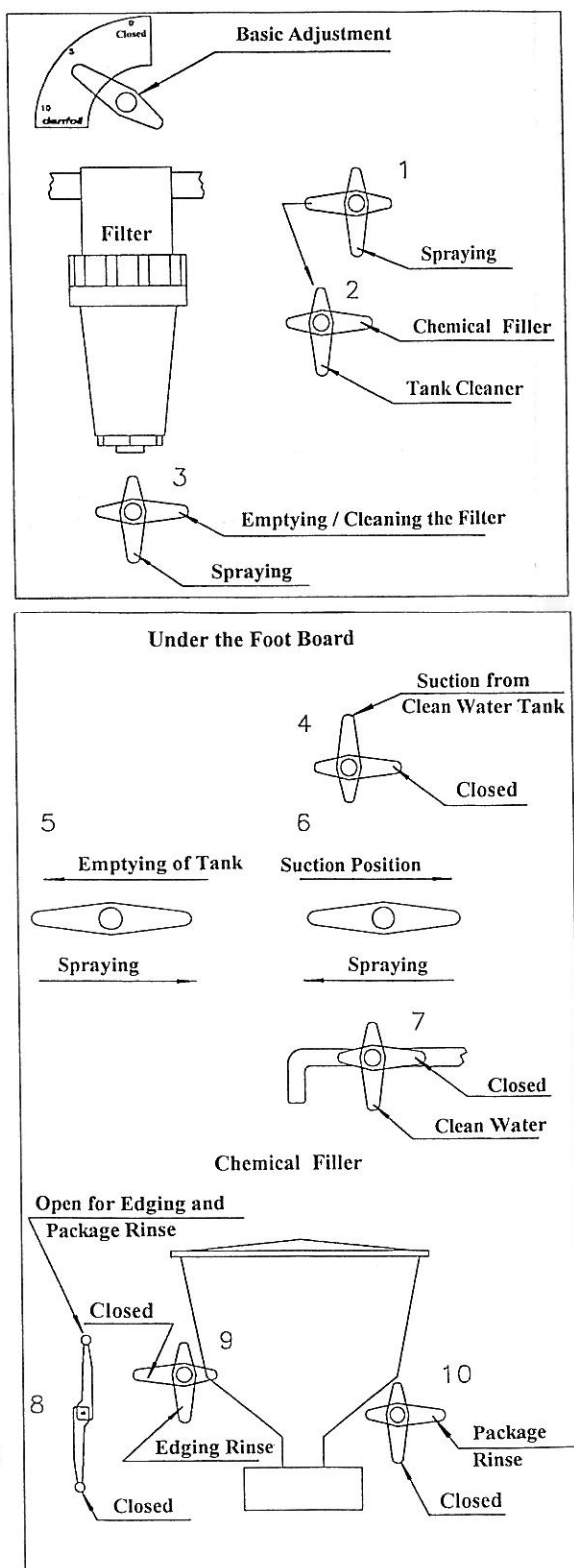


Fig. 2

### 4.3 Calibration of the Flowmeter

Before operating the sprayer, the flowmeter must be calibrated to ensure that the reading corresponds to the actual flow rate. Calibration is normally done only once a year before a new spraying season. Calibration is carried out with water, while the tractor is stationary. During calibration, the sprayer must stand securely in order to ensure precise readings on the tank (placed on supporting legs or on a firm foundation).

*N.B. Instructions regarding calibration is described in the section on adjustment of monitor.*

### 4.4 Adjustment of Liquid Volume

The quantity of liquid sprayed (l/ha) is adjusted in two levels (A & B).

#### A. Basic Adjustment

The main tap (scale 1-10) determines the distribution of liquid from the pump into the tank for agitating as well as for spraying from the boom.

When the main tap is closed (scale 0) the total output of the pump is returned to the bottom of the tank for agitating.

In order to spray at 30-40 litres/hectare the main tap is set on scale 3-4,5.

If the main tap is opened completely (scale 10), this normally induces spraying at 60-80 litres/hectare at 6-7 k.p.h.

**The pressure control valve:** The outer pressure control valve near the filter has been pre-set to a pressure of 3,5 bars. This pressure has been set at maximum no. of revolutions and with closed motorised valves.

#### B. Fine Adjustment

The driver or the monitor can control the motor valve mounted on the return hose electronically. This motor valve fine adjusts the quantity of liquid (litres/hectares) within the limits of the settings of the main tap.

Therefore, the main tap should always be adjusted accordingly, leaving a certain amount of surplus liquid for the return hose. At a fixed spray output of 35 litres/hectare, the adjustment of the main tap should normally allow the aid of the motor valve to reach a maximum of 60 litres/hectare. This adjustment will render you the most stable spraying function.

*Re. AUTO/MAN dosage: Please study the section on adjustment of the monitor.*

### 4.5 Trial Run in the Field

In order to ensure that every part of the sprayer is in working order, a trial run in the field using clean water is recommended. During this trial run all functions and adjustments of the sprayer should be tried out and practised.

## 4.6 Choice of Working Width B5

Two working widths can be chosen: Full working width or a working width of 12 metres. When spraying at a working width of 12 metres, the outer parts of the boom should not be unfolded. The anti-dazzle screens at the end of inner boom pipe and the motor valves for the outer boom sections should be shut.

# 5. Dosage & Filling of Pesticides

## 5.1 Usage of the Dosage Instruction

Section 5.2 describes the *recommended* water quantities and dosage of pesticides for the **danfoil** sprayer.

*Please note*, that the Dosage Instruction for each pesticide refers to *the dosage* appropriate for *the same task at the same time utilising a conventional sprayer*.

*Also be aware*, that all stated recommendations are *only for guidance*, as many circumstances at the time of the spraying may indicate other spraying techniques.

*Always study the pesticide supplier's instructions for the individual pesticide, regarding application, blends and blending sequence, as well as the instructions regarding security precautions and the cleaning of the sprayer etc.*

## 5.2 Recommended Liquid Volume & Dosage Suggestions regarding the usage of pesticides for the **danfoil** Sprayer under optimum conditions.

### Recommended Water Quantities:

: 30-40 litres/hectare    : 50-60 litres/hectare    : 70-80 litres/hectare

**Recommended chemical dosage** is marked with \* / \*\* / \*\*\* according to the following scale:

- \* Approximately the same dosage as used a conventional sprayer, as the efficiency of the chemical used is secured by merely using a danfoil sprayer.
- \*\* Approx. 70% of the recommended dosage for a conventional sprayer
- \*\*\* Approx. 50%

<p><b>A) HERBICIDES</b></p> <p><b>GRAIN:</b></p> <p>* — Soil Herbicides</p> <p>* — Foliar Herbicides:</p> <p>* — Hormones</p> <p>* — “Mini Herbicides”, e.g. Ally, Express &amp; Glean</p> <p>** — Contact Herbicides, e.g. Ariane S, Basagran, Dantril, Mylone Power, Oxinol, Oxitril &amp; Stellan/Herbalon</p> <p>** — Systemic Herbicides, e.g. Barnon Plus/ Lancer Plus, Avenge &amp; Roundup</p> <p>** — Mixed Herbicides, e.g. Flexidor + Mylone Power IPU-Agents + Mylone Power “Mini Herbicides” + Oxitril</p> <p><b>RAPE:</b></p> <p>* — Soil Herbicides</p> <p>** — Foliar Herbicides, e.g. Benasalox, Fusilade &amp; Matrigon</p> <p>** — Mixed Herbicides, e.g. Bladex + Benasalox or Lontranil</p> <p>N.B. Approx. 30 cm Vs air pressure</p> <p><b>PEAS:</b></p> <p>* — Soil Herbicides</p> <p>** — Mixed Herbicides, e.g. Bladex + MCPA, Stomp + Basagran MCPA</p> <p>N.B. Approx. 30 cm Vs air pressure</p> <p><b>BEEETS:</b></p> <p>* — Soil Herbicides</p> <p>** — Foliar Herbicides, e.g. Goltix, Betanal Products, Fusilade, Matrigon &amp; mixtures</p> <p><b>POTATOES:</b></p> <p>* — Soil Herbicides</p> <p>** — Foliar Herbicides, e.g. Hormone Agents</p> <p>*** — Desiccation Pesticides, e.g. Basta</p>	<p><b>B) GROWTH REGULATORS</b> (in tank mixture)</p> <p>*** —</p> <p><b>C) FUNGICIDES</b></p> <p>*** — Grain &amp; peas</p> <p>** — Rape &amp; Beets</p> <p>* — Potatoes</p> <p>* — Strawberries &amp; onions</p> <p><b>D) INSECTICIDES</b></p> <p>** — Pyrethroides</p> <p>* — Other insecticides</p> <p><b>E) MANGANESE FERTILIZER</b></p> <p>— Manganese Chelate</p> <p>— Manganese Sulphate Powder (good quality, e. Brøste or Kodak)</p> <p>— Manganese Sulphate Solutions, as liquid</p> <p><i>Never mix manganese sulphate solutions with hormone agent</i></p> <p>Manganese sulphate solutions should only be mixed with 1 fungici and 1 insecticide. Manganese sulphate should only represent 10% water volume/hectare.</p> <p><b>N.B. All stated recommendations are only for guidance, as ma circumstances at the time of the spraying may indicate oth spraying techniques</b></p> <p><i>Always follow the blending instructions given by the companies f the individual agents concerning blending and sequence blending.</i></p>
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### 5.3 Filling of Pesticides

First, study the label on the pesticide package. Fill the tank with the pesticides using the filling hole at the top of the tank or the chemical mixer (if mounted).

***For operation of the filling equipment for chemicals please consult section 9.1.***

Always use the strainer in order to avoid impurities inside the tank.

For filling the tank through the filling hole at the top of the tank, a working platform should be established flush with the foot board of the sprayer. Otherwise, the chemicals should be decanted into smaller containers in order to avoid risk of spillage when climbing the foot board.

***When filling the tank with water and pesticides, the tractor may only be running at a speed of approx. 500 r.p.m. on the power take-off. This prevents the noise level from the blower from exceeding 70 dB.***

### 5.4 Protection Precautions

Please exercise the utmost care during spraying, when cleaning the sprayer and especially during the mixing of spraying liquid.

The various protection precautions, your personal protection wear as well as the rules for the disposal of chemical residues and empty containers are carefully described in material from the authorities. ***Read them!***

***Following protection wear should be worn:***

- ***Gloves***
- ***Boots***
- ***Headgear***
- ***Respiration protection***
- ***Close-fitting protective spectacles***
- ***Protective wear which prevent skin contact with any chemicals***

***It is not allowed to eat, drink or smoke when working with chemicals. Always keep clean water nearby. The content of the clean-water tank may be drawn from the tap situated at the left of the pressure filter at the bottom of the tank.***

### 5.5 Agitating inside the Tank

The air valve for the air blower should always be closed during agitation inside the tank. Otherwise, it involves a risk of burning the belts of the blower (especially with the boom hoses in transport position). For maximum agitating effect, please close the main tap completely (scale 0). This allows the complete water volume to flow directly into the agitating jets at the bottom of the tank, and ensures efficient agitation.

Further more, a completely closed main tap ensures that no liquid passes through the filter during agitation, reducing the need to clean the filter. The high chemical concentration of the spraying liquid and the efficient agitation in some cases cause the formation of foam inside the tank. Such foam can be reduced/removed by anti foam agents, which can be acquired from a pesticide supplier.

## 6. Spraying in the Field

### 6.1 General Rules

The most important task for the driver is to ensure the correct air pressure and the correct boom height, when spraying the crops. Please consult the following sections regarding spraying technique.

*Remember never to start driving in the field before the new spraying liquid has flushed the rinsing water from the boom hoses etc.*

*Please, be very aware of the weather conditions and adjust the sprayer accordingly in order to avoid damaging the shelter belts and neighbouring crops.*

A wind gauge mounted on the tractor cabin is an aid in determining whether it is permissible to spray under the present circumstances.

It is possible to control the penetration and the deposition on the crops by attaching small pieces of water sensitive paper on the plants.

Such paper can be acquired from **danfoil production a/s**

### 6.2 Adjustment of Air Pressure

**General air pressure recommendations:**

**On bare ground and in low crops (phase 1-5):**

Please spray at low pressure (10-13 cm Vs) in order to obtain larger droplets and less risk of wind drift. The boom height is adjusted, so as to allowing the spray to just touch the ground (the plants or small parts of plants on the ground should be moved gently by the air).

Risk of wind drift requires the driver to pay great attention to air pressure and boom height.

**Beets:** Spraying should be carried out according to the above (bare ground and low crops)

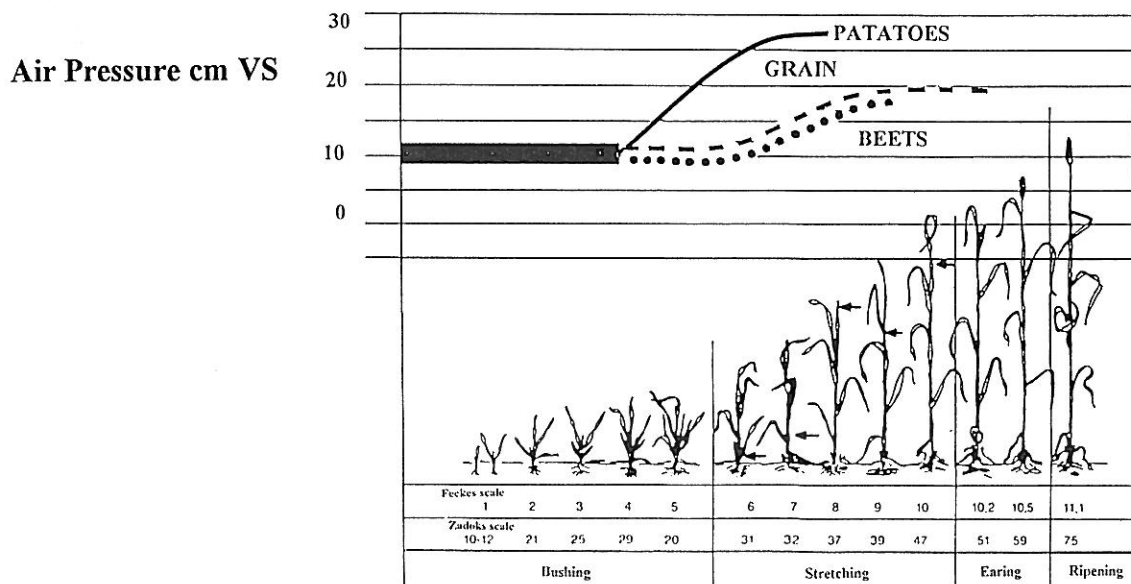


**Grain:** When spraying weeds and fungi (first runs) (phase 1-5) low pressure should be applied allowing the plant to be moved gently by the air. Please avoid too high air pressure to flatten crops. As crops grow (phase 6-10), the air pressure may be heightened in order to obtain better penetration, a larger number of small droplets and thereby better coverage of the plants. The last runs (phase 10-11) should be carried out at a approx. 22 cm Vs air pressure.

**Potatoes:** The first sprayings in potatoes should be carried out at low air pressure. As crops grow the air pressure should be heightened accordingly, finishing at approx. 25 cm Vs for the last three sprayings against blight and for desiccation.

*For further information please study section 6.4 on recommended spraying technique.*

**The recommended air pressure** is presented in the curve below. The air pressure should depend on the growth and the height of the plants as well as on the weather conditions. The curve should only serve as guidance, since circumstances at the time of the spraying may indicate another air pressure.



### 6.3 Adjustment of Boom Height

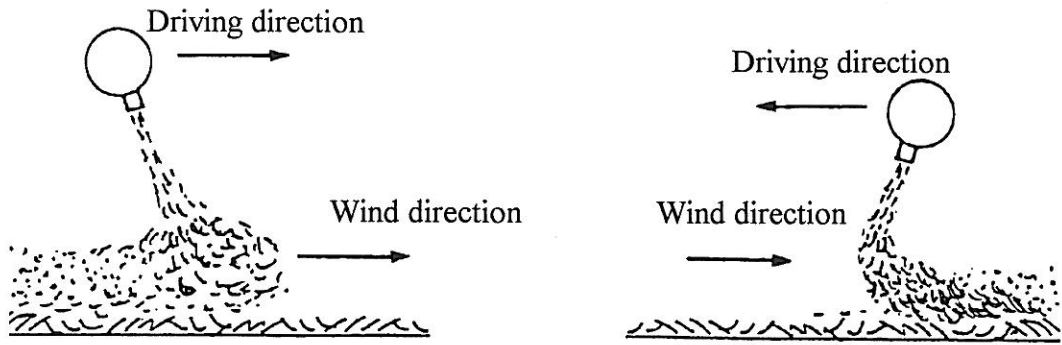
**The recommended height of the boom** is 60-80 cm above the crops. The largest deposition of spraying liquid is found in the lower third of the range of atomizers, due to the turbulent air stream in this area.

The theoretical principle of the sprayer is to let the air around the plants be replaced by the downward air stream of the sprayer.

*At low air pressure, the boom should be situated lower than at high air pressure.*

*If the boom is situated too low, it will cause the spraying liquid to be dispersed unevenly (in stripes).*

### Spraying in following and contrary wind



When spraying in windy weather, the driver should be aware that the range of the atomizers is reduced by contrary wind. This makes it necessary to situate the boom lower at contrary wind compared to following wind.

When the wind blows obliquely from in front, the part of the boom turning against the wind should be situated lower than the part of the boom sheltered by the tractor.

	Following wind	Contrary wind
Boom height	Higher boom	Lower boom
Speed	Higher speed	Lower speed

**The recommended speed** is 6-7 km/h. Lower speed is recommended when spraying dense crops and beets.

## 6.4 Recommended Spraying Technique (examples)

The spraying instructions below are *only for guidance*, as many circumstances at the time of the spraying may indicate other spraying techniques.

Crops	Task	Phase Ç Feekes Scale	Liquid Litres/hectare	Air Pressure cm Vs	Speed km/h
Grain	Weeds	0 - 5	30	10 - 13	6 - 8
	Fungi	1 - 5	30	10 - 15	6 - 8
	Fungi	6 - 10	30	14 - 18	6 - 7
	Pests	6 - 10	30	15 - 18	6 - 7
	Growth Regulator	4 - 10	30	15 - 20	6 - 7
	Wild Oat	5 - 7	30	15 - 20	6 - 7
	Fungi/Pests	10 - 11	30	20 - 22	6 - 7
Rape	Weeds	1	40 - 60	10 - 12	6 - 8
Peas	Weeds	2	40 - 60	10 - 12	6 - 8
Beets	Weeds	4 - 5	35 - 50	10 - 14	6 - 7
	Pests	6 - 9	30 - 50	14 - 18	5 - 6
Potatoes	Mould (Blych)	2 - 3	30 - 40	12 - 16	6 - 8
	Mould	4 - 7	30 - 40	14 - 18	5 - 7
	Desiccation *	7	30	20 - 25	5 - 7
General	Soil Pesticides	0	30	10 - 12	6 - 8
	Manganese Fertiliser	1 - 5	30 - 50	10 - 12	6 - 8
	Manganese Fertiliser	6 - 8	30 - 50	10 - 14	6 - 7
	Liquid fertiliser/ foliar fertiliser with N-22, kl. 16-21	8 - 9	30 - 100	approx. 8 - 12	6 - 7
	Coach grass, before harvest, growing well	10 - 11	30	14 - 17	6 - 7
	Coach grass, after harvest	Stubble	30	10 - 12	6 - 8

### Remarks:

\*) Desiccation as split spraying is recommended for well-developed potato plants that have been watered and fertilised well.

Ç) The development phase of the single plant is shown on the last pages of the "report on cultivation of plants" (review of the national tests)

**Caustic Soda** is recommended for cleaning after using agents of low solubility. Contains sodium hydroxide. Should be used as a 3-5% solution. (5% solution: 1 kg per 20 litres of water). This detergent should be used with care - it is strongly caustic.

**Triodan** (liquid) is an alternative to caustic soda. Contains sodium hydroxide, potassium hydroxide and anti-calcifier.

This detergent should be used with care - it is strongly caustic.

**Ammonia Water** is recommended for cleaning after using Ally, Express and Glean. Per 100 litres of water, please add: 1.0 litres of ammonia water (3%) or 0.3 litres of triple ammonia water.

Remarks: Ammonia water has in some cases replaced chlorine as detergent for cleaning the sprayer, because chlorine is not capable of dissolving the greasy and oily film sometimes found inside tank and sprayer. Ammonia water has proved to be the best detergent for dissolving these oily films, so that they can be rinsed out during the recommended rinse-outs. Ammonia water and chlorine should never be blended, as they develop poisonous gases.

## 7.2 Cleaning of the Sprayer

**Before a new season**, the sprayer should be cleaned using warm water and an approved detergent followed by thorough rinsing. Please check the liquid supply of the boom for any faults.

**Emptying the sprayer** should be carried out using the front tap under the foot board. N.B. Be aware that this procedure still leaves some spraying liquid inside the pump, the filter and the hoses. Such liquid is led to the tank by letting the pump draw clean water through the socket at the rear tap under the foot board. The motor valve on the return hose to the top of the tank should be left open. The filter is emptied and cleaned.

**Rinsing of the boom system and the flowmeter** is carried out in the field using water from the clean water tank or by coupling a hose to the socket beside the filter. A rinse-out with water from the clean water tank is carried out by operating a switch on the control panel. The switch is placed under “*change-over*” taps.

For rinse-out with hose, please alter the position of these taps: The main tap must be completely closed and the tap for the upper return hose should be turned 180° (the indicator pointing downwards)

***Remember to equip the hose with a nonreturn valve.***

After spraying with ***soluble agents*** that do not cause the formation of film, water is normally sufficient to for **the daily cleaning**. The empty tank is rinsed thoroughly with water, and the filter is then emptied and cleaned.

After spraying with ***agents of low solubility*** that do cause the formation of film, the daily cleaning has to be more thorough. The entire spraying system must be rinsed thoroughly with water containing detergents. The atomizers are cleaned manually with a brush and a detergent, and the filter is emptied and cleaned. Finally, the entire spraying system is rinsed thoroughly with water.

## 7. Cleaning of the Sprayer

### 7.1 Cleaning Advice

***A sprayer should be kept clean - not cleaned!***

Therefore, residues of spraying liquid and chemicals should never be left to dry inside the sprayer. *Always study the cleaning instructions on the package of the pesticide.*

#### Important cleaning advice

The cleaning of the sprayer is facilitated if the sprayer is ***thoroughly rinsed*** at the end of each spraying job. Mounting of a clean water tank is highly recommended. Each rinse-out and clean-out must always be followed by ***emptying and cleaning the filters***.

***The emptying, rinsing and cleaning of the sprayer should be carried out in the field or on a washing ground, where the slops are collected.***

**The Motor Valve** on the return hose leading to the top of the tank should always be kept open during emptying and cleaning of the sprayer (please look inside the tank).

In order to ensure efficient cleaning of **the motorised valves and the motor valve**, they need to be operated a couple of times during the cleaning process, when the cleanser is pumped through the system.

**The Atomizers** are most efficiently cleaned, when the air supply is on full power while the cleanser is pumped out through the boom system. If this procedure is not sufficient, please carry out the cleaning manually with a brush and a cleanser. **(Never spray directly on the atomizers with a high-pressure cleanser).**

**Warm water** will increase the effect of the cleanser and shorten the cleaning process. After spraying potatoes etc. using chemicals of low solubility, the sprayer needs to be cleaned thoroughly. Always remember the *external cleaning* of both tractor and sprayer.

**After rinsing and cleaning** the sprayer, resumption of spraying in the field should never take place until the rinsing water is completely out of the boom system and has been replaced by spraying liquid.

#### Recommended detergents

##### 1. Internal Cleaning

**Ordinary Soda** is recommended for cleaning after using soluble agents.

The internal cleaning of the tank is facilitated by a **rotary tank cleaner** (accessory). This rotating tank cleaner is supplied by the pump and makes the water (perhaps added detergents) circulate inside the tank at very high pressure. Please leave the water to circulate for approx. 15 min., then follow the instructions above. The tank cleaner is activated by turning tap no. 1 & 2 fig. 2 180°.

**Cleaning in connection with change of chemicals** must be done very thoroughly. It is especially important to drain all spraying liquid from the system as well as cleaning the tank thoroughly. ***Remember also to clean the filling equipment for chemicals*** (if mounted).

The package of the chemicals often contains suitable cleaning instructions. If not, please study the instructions in section 7.3.

**External cleaning** of the tractor and the sprayer must be carried out whenever needed. For cleaning, please use an approved detergent as well as an approved high pressure cleaner (do not clean the atomizers with the high pressure cleaner).

**Cleaning of the sprayer at the end of a season** is done thoroughly both outside and inside as described previously.

The ***anti drip devices*** demand further cleaning: The anti drip devices are removed and left in a bucket with water added detergent for a couple of hours. Subsequently, they are rinsed and blown dry at high pressure before refitting.

It is recommended to change the diaphragms once a year, if the sprayer is used often.

**Frost protection** of the sprayer before winter is done by filling the tank with an anti-freeze solution, letting it circulate inside sprayer and boom. (e.g. 20 litres of water + 7 litres of anti-freeze solution)



## 7.3 Cleaning Procedures

<p><b>DU PONT</b> recommends the following procedures</p> <p><i>Cleaning of the spraying equipment after using ALLY 20 DF, EXPRESS and GLEAN 20 GF.</i></p> <ol style="list-style-type: none"> <li>1. Right after spraying, the sprayer should be rinsed thoroughly with clean water. The rinsing water might be sprayed on the crops just sprayed. Remember also to clean the equipment outside.</li> <li>During cleaning, please operate all the valves/taps allowing all hoses to be rinsed. Furthermore, the sprayer should be emptied completely between each rinse/wash.</li> <li>2. Fill the sprayer with water blended with 0.3 litres of triple ammonia water per 100 litres of water (Please study the sections below regarding other detergents*). Next, rinse the hoses and the boom. Fill the tank with water, start the agitator and leave it to rinse for at least 15 min. Empty the sprayer through boom/nozzles, and rinse the tank/the boom with clean water.</li> <li>3. The nozzles and the strainer should be cleaned separately using the same detergent and the same concentration as for the sprayer.</li> <li>4. Repeat step 2.</li> <li>5. Rinse the tank/sprayer thoroughly for 5 min. while simultaneously spraying the detergent out through boom/nozzles.</li> </ol> <p><i>The rinsing water should be discharged in areas where no damage is done to trees and crops, and where it will not run into streams, wells and drains.</i></p> <p><b>* Other detergents approved by DU PONT</b></p> <table border="0"> <tr> <td>Ammonia Water</td> <td>1 ltr./100 ltr. Water</td> </tr> <tr> <td>UNIQUE TX 20*</td> <td>0.5 ltr./100 ltr. Water</td> </tr> <tr> <td>Red Sprayer cleaner (Shell)</td> <td>1 ltr./100 ltr. Water</td> </tr> <tr> <td>All Clear</td> <td></td> </tr> </table>	Ammonia Water	1 ltr./100 ltr. Water	UNIQUE TX 20*	0.5 ltr./100 ltr. Water	Red Sprayer cleaner (Shell)	1 ltr./100 ltr. Water	All Clear		<p>a) <b>Danfoil production a/s</b></p> <p><i>In our experience, the following cleaning procedures are als appropriate.</i></p> <ol style="list-style-type: none"> <li>1. Emptying and rinsing the sprayer as well as the filters.</li> <li>2. Cleaning</li> </ol> <p>40 ltr. Water + 1-2 kg caustic soda</p> <ul style="list-style-type: none"> <li>- This blend is sent through the hoses and the boom.</li> <li>- Leave inside the system for 10-15 min.</li> <li>- The tank is rinsed inside.</li> <li>- The atomizers are cleaned using a brush.</li> <li>- The outside of tractor and the sprayer is cleaned.</li> <li>- Emptying through boom using air.</li> <li>- The filters are emptied and cleaned.</li> </ul> <ol style="list-style-type: none"> <li>3. Rinsing</li> </ol> <ul style="list-style-type: none"> <li>- Two charges of water are sent through the system.</li> <li>- If needed, please add Lissapol to the last charge of water</li> </ul> <p><i>After spraying with Ally, Express and Glean, an additional disinfection is necessary:</i></p> <p><i>The tank is filled completely with water added 1.0 ltr Ammonia water (3%) or 0.3 ltr. Triple ammonia wate (9%) per 100 ltr. Water.</i></p> <ul style="list-style-type: none"> <li>- The blend is sent through the hoses and the boom.</li> <li>- The tank is replenished with water.</li> <li>- Is left inside the system for 10-15 min.</li> <li>- The outside of the tractor and the sprayer is rinsed.</li> <li>- The sprayer is emptied (partly through the boom by usin air).</li> <li>- Emptying and rinsing of filters</li> </ul>
Ammonia Water	1 ltr./100 ltr. Water								
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## 8. Fault Detection

Fault	Cause	Correction
<b>Hydraulics</b>		
No hydraulic functions	The hoses are incorrectly fitted	The hoses are changed/correctly fitted
	Loss of power for the electro hydraulic valves B5	Check the current supply (fuses, relays & wiring)
Rams will not operate	Impurities in the oil	B3: The restrictor on the cylinder is cleaned B5: The restrictor on the block of valves is cleaned
Uncommonly quick response		Contact the dealer
<b>Air</b>		
The indication of the manometer unchanged	The manometer is out of order	Exchange
Falling air pressure	The belts for the blower are too loose	The belts are tightened
	The air hose leaks	Exchange
	The boom leaks at the swivel point	The bar is completely unfolded and the gaskets are exchanged
<b>Spraying liquid</b>		
No or a too small amount of liquid led to the boom	The main tap is closed	Open
	The filters are blocked	Clean the filters
	The liquid supplying hose is blocked/kinked	Loosen
	The motorised valves do not open	Power supply problem Check the fuses Lack of cleaning
	The bottom valve inside the tank do not open (no pressure)	Adjust the pressure control valve Contact the dealer
Frequent obstructions of atomizers	The filter cartridges leak	Replace
	Debris inside the system	Thorough cleaning
A single atomizer applies too small an amount/nothing	The nozzle on the side of the atomizer is blocked	Clean

Two neighbouring atomizers apply too small an amount	The anti drip device stuck	Clean
Several atomizers sharing the same supplying hose apply too small an amount	The throttle on the hose is blocked	Clean
Bad atomisation	Debris stuck in the atomizer	Remove debris
	The trailing edge is not sharp	Replace
Excess pressure	The bottom valve in the tank is blocked	Contact the dealer
Max. output to low	Main tap is closed too hard	Open
	The filter is blocked	Clean
	The pressure valve need adjustment	Contact the dealer
The indication of the flowmeter varies	Poor cleaning of the system	Thorough cleaning

## 9. Operation of Accessories (if mounted)

### 9.1 Filling Equipment for Chemicals

In order to facilitate and secure the filling of chemicals, a special filling device for chemicals can be used. The pesticide agent is poured into the container where it is pumped into the tank. The Chemical Filler is operated by turning the tap on the control panel (no. 2 fig 2) 180°

The Chemical Filler is equipped with an edging rinse, which is used for rinsing the container after filling the tank. The edging rinse is operated by opening the tap at the back of the Chemical Filler (no. 9 fig. 2). Further more, it is equipped with a device for rinsing the package of the chemicals. This device is operated by opening the tap on the right side of the Filler (no. 10 fig. 2). However, the tap on the left side has to be opened first (no. 8 fig. 2).

***Remember to clean the Chemical Filler together with the rest of the sprayer.***