



Agrofrost WIND MACHINES

We cover more ground !



- ◆ We have the most powerful fan blade on the market.
- ◆ Possibility to add several burner units.
- ◆ The tower can be laid down and set up electrically.
- ◆ Also available with gear box for a tractors PTO.
- ◆ We cover more ground and provide better protection.

Why the Chinook Fan Prop?

Chinook fans have improved aerodynamics with an 80 degree sector angle!

The aerodynamics of the Chinook blade make it different from other blades. While other fan props move air within a sector angle coverage of 45-60 degrees, the Chinook prop widens the sector angle circle of coverage to 80 degrees, significantly increasing the velocity of air and air movement on the ground where coverage is needed.

Chinook fans cover more ground, wider area, longer duration!

Numerous field comparison tests have been performed comparing the Chinook blade with competitive blades that do not have the trailing edge wedge. In all scenarios, the Chinook blade performed better, covering more ground, over a wider area, and for a longer duration of time during rotational cycle.

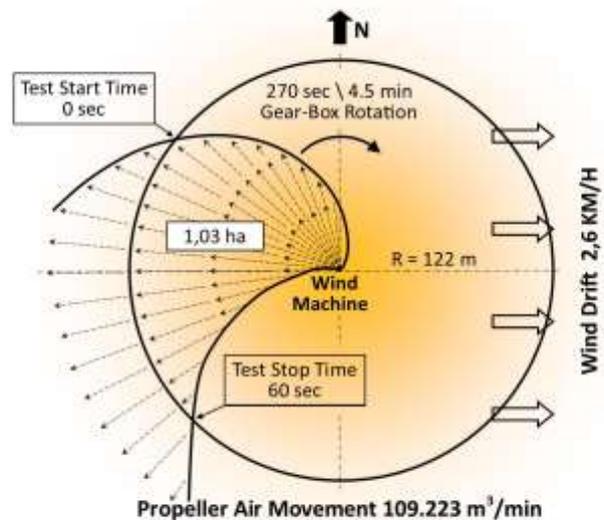
Chinook fans protect the fruit bud longer and better!

Protection of the fruit bud/plant has increased from 35 seconds to over 60 seconds on each rotational cycle. Chinook's wider sector angle coverage mixes air not only in the horizontal plane, but also in the vertical plane. This advantage gives you a bud with additional protection even on uneven ground.

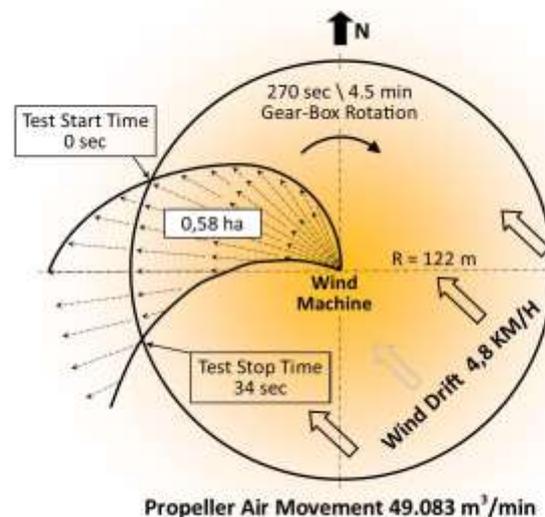
Chinook fans move larger volumes of air, with more immediate temperature rise!

Drawing warmer air from the upper atmosphere with increased sector angle helps to raise the temperature on the orchard floor more quickly than with other prop styles. In one documented test, the Chinook fan blade mixed and moved 109.223 m³/min of air compared to 49.083 m³/min of air from another competitive fan blade. This is over 2 times more volume of mixed air with the Chinook fan.

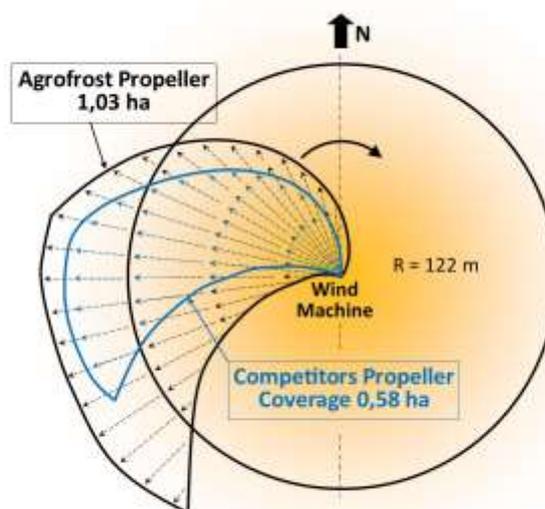
CHINOOK PROPELLER



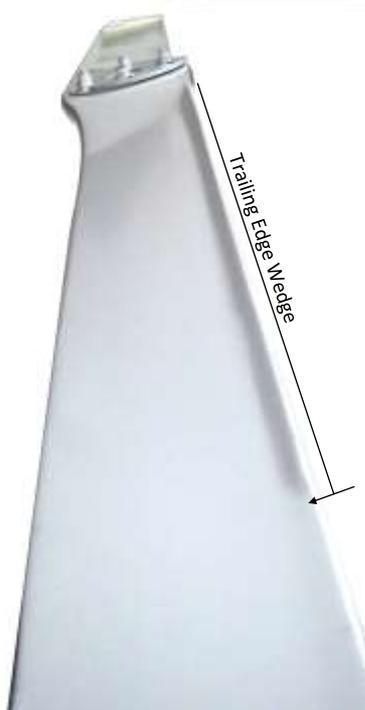
COMPETITORS PROPELLER



COVERAGE AREA COMPARISON



One piece, lightweight propeller design !



The Chinook blade is constructed from composite fiberglass; machine made into one piece. The blade, with steel teeter hub attached, weighs only approx. 45 kg. This low weight and one piece form provides for smooth running, vibration-free operation.

An advanced airfoil design, developed by NASA engineers, is incorporated into each blade featuring a trailing edge wedge, that increases air movement, and Dornier swept tips to reduce drag and air turbulences that builds up at the ends of the fan blade tips. These features work together to produce more air movement, with wider area coverage for a longer duration of time. As a result, the total surface protected is increased.

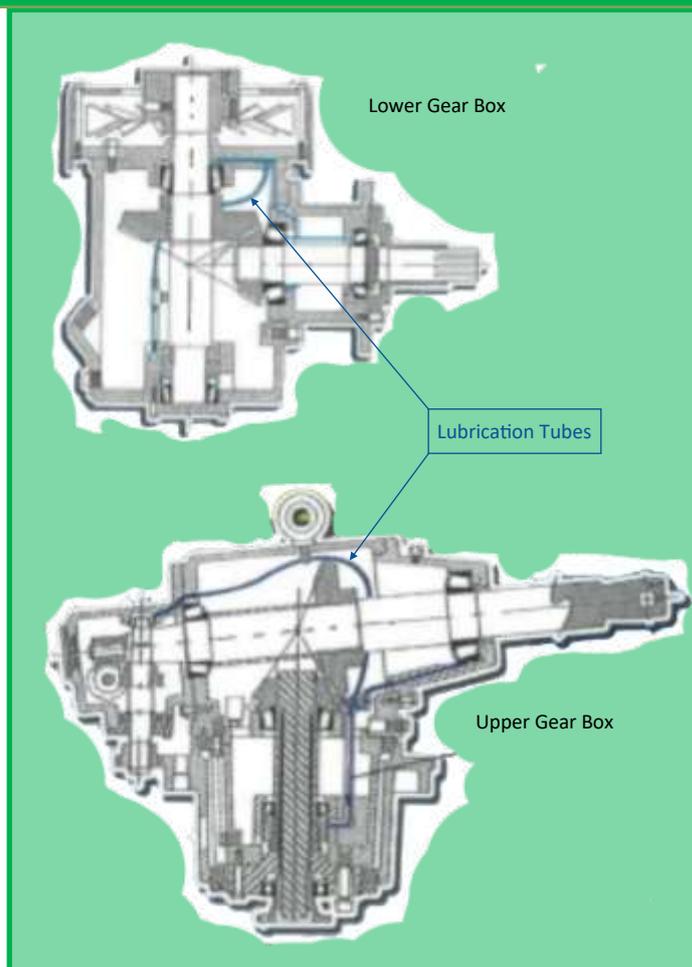


Pressure Lubricated Gear Drives !

Central to the reliability of any wind machine is the gear box.

Here's why we do better than the competition:

- Both top and bottom gear boxes are equipped with pressure lubricating.
- We use 100% Timken tapered roller bearings with a design life of 18.000 hours. This represents a load capacity of at least 10% greater than any current competitive gear drive.
- Our gear drives are built with spiral bevel gears of hardened alloy steel.
- Because our gear drives are pressure lubricated and fan cooled, oil temperatures run at least 10 °C cooler, doubling the life of the lubrication oil.



We can also deliver a gear box to drive the wind machine through the tractor's PTO.

The easiest way to install and maintain your Wind Machine !

Installing a wind machine can be a dangerous job. So is maintenance: to change the oil in the upper gear box, the technician has to climb all the way to the top of the wind machine.

To simplify installation and maintenance, and above all to make it safer, our tower can be equipped with the possibility to set up and lay down the tower using a electrical jack.

Another advantage: You save time and money, both during installation and maintenance. A big crane is not needed anymore for installation.



Different Propellers

Depending on the surface you need to protect, we have 4 different propellers available:

- N: covers 3 hectares
- E: covers 4 hectares
- Z: covers 5 hectares
- V: covers 6 hectares

Engines

Depending on the type of propeller you want to use, you have the choice from 4 different engines:

- Ford Triton V8 - 5.4 L - 129 hp - propane
- Ford Triton V10 - 6.8 L - 160 hp - propane
- Iveco - 4 cyl. - 4.5 L - 93 hp - diesel
- Iveco - 6 cyl. - 6.7 L - 165 hp - diesel



Auto Start System

All models can be delivered with the Auto Start Option. This system automatically starts and stops the engine with the use of a remote temperature probe. Because it automatically shuts down the engine when the temperature is high enough, it saves on fuel. So the extra investment not only pays back in time quickly, it certainly makes you sleep better.



The most powerful and most economical heating system !

A wind machine gives good protection if two conditions are met: there must be a good inversion layer and the temperatures should not go too far below zero.

If there is no inversion layer, there is no warm air that can be blown into the orchard. Using the wind machine in these conditions will even result in extra damage. If the temperature cools down below $-3\text{ }^{\circ}\text{C}$, the protected area will decrease significantly.

Both problems can be solved, are at least reduced, by installing an extra heating system.

Most heating systems have one burner which is placed on one side of the fan. This means that the hot air, produced by the burner, is totally picked up only during a very short time. Most of the time, the hot air just goes up into the air without being picked up by the air stream of the propeller. So, **it's not very efficient. At least 65% of the energy is lost without results.**

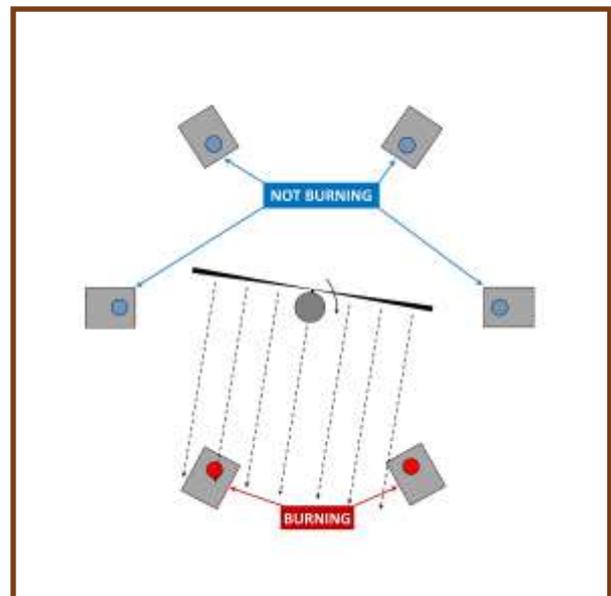
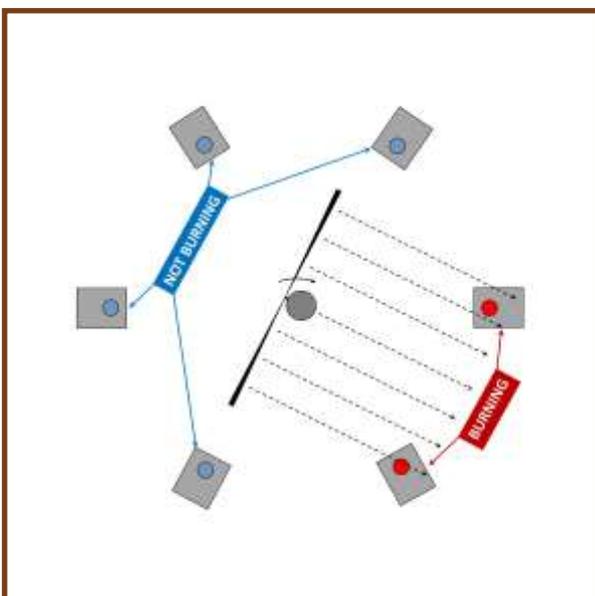
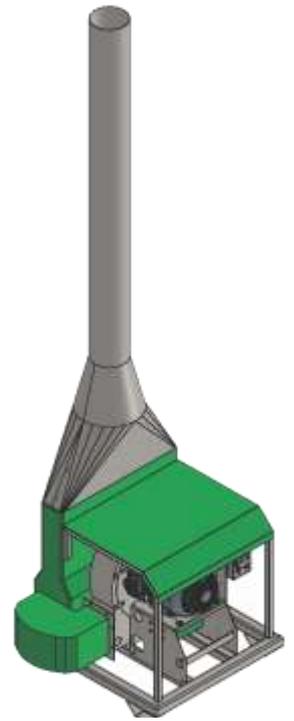
To resolve this problem, we have built smaller burner units, that can be placed around the tower. Each unit has a propane gas powered engine, a fan and a burner, and blows the heated air towards the propeller. The burners are ignited and stopped one by one sequentially, according to the air flow that comes along. So the burners work only when they are in front of **the propeller's air stream. In this way, only a fraction of the energy is needed to get to the same result.**

The ideal set up is to use 3 or 4 burners, but it's also possible to use just 1 or 2.

Advantages:

- ◆ Our burners work on propane gas, so environmentally friendly.
- ◆ The capacity of each burner can individually be adjusted (raised) if weather conditions require so.
- ◆ Consumption is reduced to 30-40% compared to other burners.
- ◆ Efficiency is raised by 300 %.
- ◆ **It's possible to work with 1, 2, 3 or 6 burners.**
- ◆ Our burners can be used in combination with any wind machine.

The example below shows a configuration with 6 burners of which two are working at the moment the propeller's air stream passes by. When the air flow is past a burner, this burner will be switched off. Another burner will then come into the range of the propeller and will be ignited.



Technical Specifications

Fan Propeller Blade	
One piece construction	Fiberglass wrapped over urethane foam core; high strength, low weight, increased rigidity.
Hub Area	Airfoil and air movement begins 35 cm from hub centre improving air performance.
Swing Weight	Low fan swing weight (47 kg), less friction, less horsepower consumed, less tower vibration, increased gearbox/drive train life.
Advanced Airfoil Design	NACE 4409 airfoil, trailing edge wedge, swept tips - creates more air movement, reduces air resistance and improves fan efficiency.
Dornier Swept Tips	Reduce drag, smooth out air turbulence and the size of the vortices (air drag) - helps to improve air flow pattern and efficiency over the entire blade.
Trailing edge wedge	Increases air velocity, produces wider sector angle coverage from 45° to 80°.
Capacity of fan	109.223 m ³ /min
Drive Line and Tower	
Dynamic balanced drive line	Dynamic spin-balanced at 1400 RPM for smooth, vibration-free operation.
Drive line speed	1000 RPM, slower speed for vibration-free operation and longer bearing life.
Height of Tower	10,6 m
Gear Box	
Lubrication	Pressure lubrication allows for instant lubrication, pressurized oil sprays each gear and bearing dropping into a sump before recirculation, operating at temperatures 10 °C cooler. Less heat generated means more transmitted horsepower reaches the fan; most efficient gear drives available today.
Bearing Type	100 % tapered roller bearing on drive shafts, 10% greater bearing load capacity. 18000 hours life span.
Lower box fan cooled	Cooler running box doubles life of lubricating oil. Operates at 82 °C - 87 °C.
Input shafts	Lower box 1.375x10 spline; upper box 1.25x10 spline
Engines	
Propane Engines	Ford Triton V10 - 6.8 L - 160 hp * Ford Triton V8 - 5.4 L - 129 hp
Diesel Engines	Iveco 6 cylinder - 6.7 L - 165 hp * Iveco 4 cylinder - 4.5 L - 93 hp

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