lumiforte®

APPLYING GREENHOUSE COATINGS WITH A DRONE

Today's developments

smart
coating
solutions

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INTRODUCTION OF DRONE APPLICATION

Times change and techniques as well. What is developed today, is old tomorrow. For years we have used three different application techniques to apply coatings on greenhouses. Manually (with a pressure pump and a spray gun), mechanically (with equipped machines driving on top of a greenhouse) and by air via a helicopter or airplane.

Now a fourth application method has come into play: drone application. This application method is developing rapidly. In this white paper, we want to take a closer look at drones in combination with our greenhouse coatings.

Benefits of applying coatings with a drone

The advantage of using a drone for applying coatings will depend on the situation (location, size of the greenhouse, logistics).

Investment costs
In the Netherlands, coatings are often applied by contractors with heavy machine equipment. A machine applies coatings with high quality, but the investment cost of buying a machine is also high (between €100.000 - €500.000). Drones are less expensive. When you invest in a drone you spend about €30.000 including batteries, a small truck and fly certificates.

Logistics
In some parts of the world, it is difficult to carry out machine application, because the distances are large or the construction of the greenhouse itself is not suitable for a machine. For these areas, the use of drones could be a good alternative.

Labor costs
The costs of labor are high for both machine and helicopter application. A drone is controlled by one person and can cover several hectares in 1 day.

Limitations of applying coatings with a drone

When you consider choosing drone application, it is useful to ask the following questions:

- Do you need diplomas or certificates?
- Can you fly where you want or are there limitations because of cities or airfields? For example: in some countries, you need to make a flight plan for every location before you can start flying.
- Weather conditions (wind, humidity, temperature of the surface, etc.)
- Can you fly with one drone at the time, or multiple with one console?
- Are you able to make a flight plan on the computer or do you have to fly manually?

Comparison with other application methods

	Manual	Mechanical	Helicopter	Drone
Speed	■■□□□	■■■■□	■■■■■	■■□□□
Accuracy	■■□□□	■■■■■	■□□□□	■■■■□
Result	■■■□□	■■■■■	■■□□□	■■□□□
Ease to get started (costs & knowledge)	■■■□□	■□□□□	■■□□□	■■■■□

Note: drone results depend on the experience of the applicator

Types of drones

There are different types of drones available that can apply coatings. Since we are not a distributor of application drones, we have no preference for a particular brand or type. We do, however, support contractors and growers in advising about the right equipment and features. When you buy a drone for application, keep the following features in mind:

- Capacity: minimum 10 litres.
- Flight time per battery: minimum 20 minutes.
- Number of nozzles: 4 to 16 per drone.
- Nozzle types.
- Pressure: manually or by software.
- Flying: automatically or manually.
- With a battery, fuel, or electric wire.
- 1 or 2 pumps in the drone, depending on the viscosity of the product.

Avignon (France):
Drone with tank on board

Angers (France):
Drone with a hose

Beijing (China):
Drone with tank on board

Applying coatings with a drone

All coatings from Lumiforte lend themselves to be sprayed with a drone. However, since the viscosity of the products is different, you might need to change the dilution per product. For applying ReduClean, a lower dilution is needed to get the full greenhouse cleaned properly. The mixing ratio and duration of application depend on the type of drone and product. Keep the following in mind:

- Do you need diplomas or certificates?
- The weight of the drone
- The load capacity of the drone (10L or 2,64 Gal/ 30L or 7,93 Gal)
- The pressure of the pomp
- The flow of the pump (liter/min)
- The effective spray distances
- The number of nozzles and nozzle specification
- The power type (battery, electrically wired or fuel)
- The number of drones per console
- The required height to fly and apply (usually +/- 3 meters or 10 feet). The higher you fly, the more you cover, although the layer will be thinner and less homogenous.

Lumiforte collects information about drone application from growers and contractors all over the world. In practice, we see that different dilution rates are used. Below you can see an overview of some successful drone applications with our coatings in different areas.

	Northern Europe	Southern Europe		America	Asia	Asia
Dilutions (coating:water)						
ReduSol / Eclipse	1:3	1:1	1:3	1:3	1:2	1:2
ReduHeat / Transpar	-	1:3	1:3 or 1:4	1:4	1:3	1:3
ReduFuse / ReduFuse IR	-	-	-	1:6	1:3	1:3
ReduClean / Topclear	1:7	-	-	-	-	-
Tank position	on board	on board	on ground	on board	on board	on board
Loading capacity	30 liters	-	-	-	30 liters	35 liters
Power source	battery	-	-	-	fuel	battery

Westland (the Netherlands)
Greenhouse with ReduSol applied by drone

FUTURE DEVELOPMENTS

As mentioned before, tools introduced today are old news tomorrow. That is why Lumiforte is in contact with as many drone companies as possible. We see that the load capacity is increasing every year. At the moment, in 2022, the capacity can reach 30 liters. Which will make the flight time and the applied area greater than before.

Other new developments are:

- In France, companies that apply Lumiforte coatings on plastic tunnels started working with drones carried out with a hose and an electrical wire to fly continuously.
- In Canada, you can fly 4 drones at the same time on 1 console.
- The latest models have 3D information about the area, making it possible to let the drone fly automatically.

The capacity of batteries is getting larger and the possibility to get these reloaded quicker. Also, the software is changing. The newest drones have well-written software programs. Drone pilots can make a flight plan per location, and you can store this plan for next time.

Knowledge Centre

We, as a developing and producing company of coatings, gather the information and are the knowledge centre for this evolution in horticulture. This way, we know what is happening around the world when it comes to drones and the application of coatings.

If you have questions or if you are interested in sharing knowledge about drone application, please contact one of our local specialists:

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Lumiforte is a global leader in the development and production of innovative coatings. These coatings are used in international horticulture to influence light incidence in the greenhouse. For the sports sector, we produce the well-known white lines and line marking equipment.

Lumiforte offers two series of coatings under the brand names ReduSystems and Sudlac. These coatings respond to practical needs at specific locations anywhere in the world.

Lumiforte.com

ReduSystems®

Coatings for optimal crop development

SUDLAC

Coatings for maximum sunlight protection

lumiforte® smart coating solutions