HARDI TWIN

Winning Air

TWIN technology

Save time, money and environmental impact

World's best TWIN

The TWIN concept is a unique HARDI feature, which was developed based on the experiences from the mistblowers back in the 70s and 80s.

Both case stories from the end-users and the many tests and proofs which have been coming in the last 35+ years show that farmers that invest in a HARDI TWIN, invest in a sprayer in its own league.

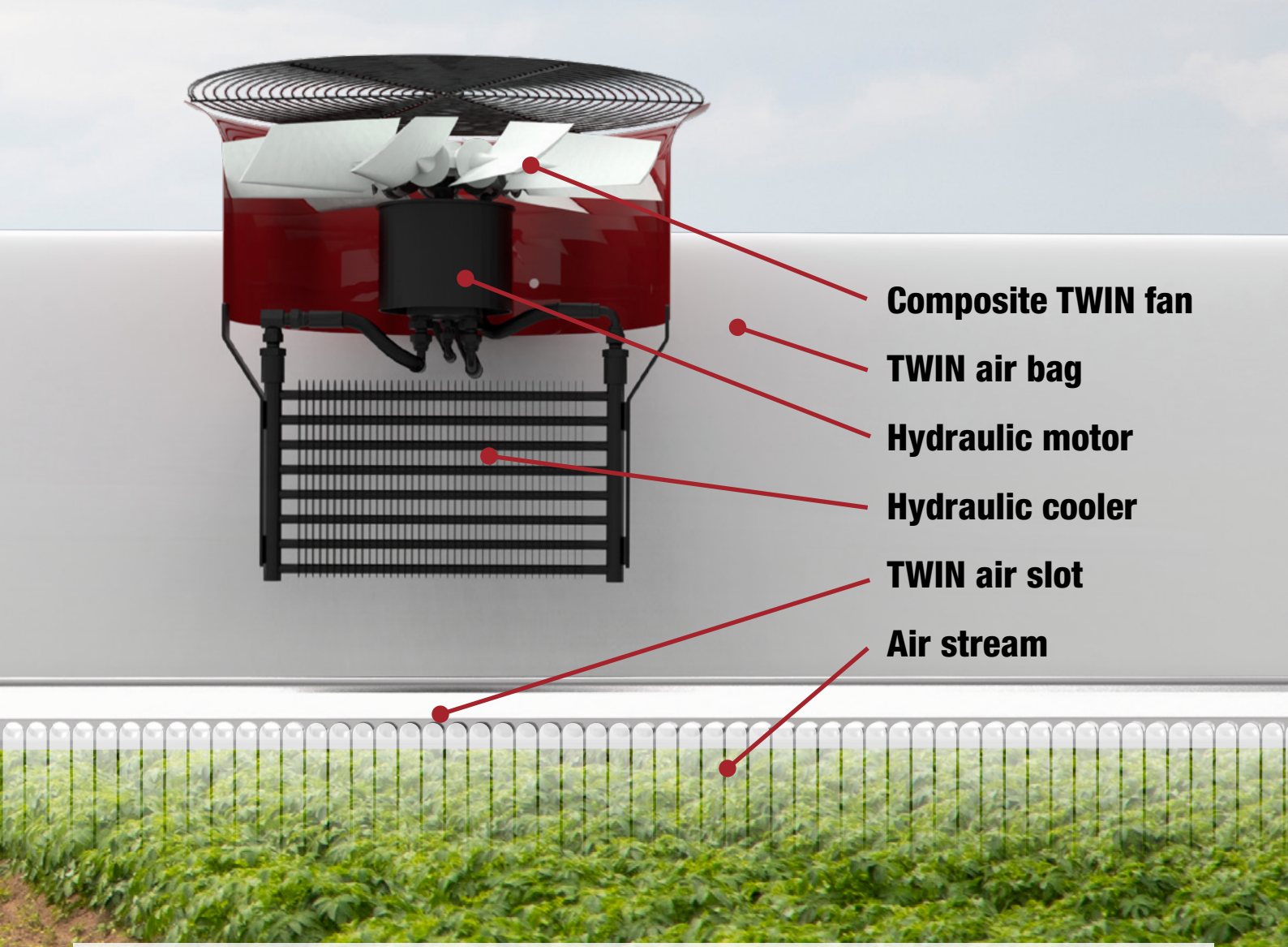
The TWIN concept is founded in an all-round understanding and control of the application in a 3D format.

The end-user can operate with far more parameters than on a conventional sprayer, such as:

- TWIN air speed
- TWIN angle
- Guide all size of droplets on the spray target

As the following pages show, farmers using TWIN also get many more spraying hours available, increase the capacity, reduce drift and chemicals while improving their overall spraying economy.

In other words TWIN is Winning Air with more than 35 years of experience.



TWIN technique

Powerful blower units provide air to the left and right boom sides respectively. The large amount of air produced by the double fans allows for faster application speeds even under very difficult weather conditions. Each blower can be stepless adjusted to a maximum output of 2000 m^3/h/m boom width and a maximum air speed of 35 m/sec.

Up to 100% more capacity

Spray drift from conventional sprayers can be so heavy that the operator has to stop before the spray job is finished. With efficient drift control it is much easier for the operator to be able to spray the entire field in one operation.

In most conditions, farmers using the TWIN sprayer get at least twice as many hours available for a safe and efficient spray job as with conventional sprayers.

Forward angling up to 40°

No angling

Backward angling up to -30°

Save money on your spraying budget

From the large number of markets where TWIN has been driving, the feed-back from end-users is often that they get an increased capacity and a better efficacy of the chemicals used per hectare.

Both benefits improve the farmer's overall economy.

Up to 100% more spray capacity

Faster spraying speed, less filling due to smaller water consumption and more spray hours during the season give the possibility to increase the spray capacity up to 100%.

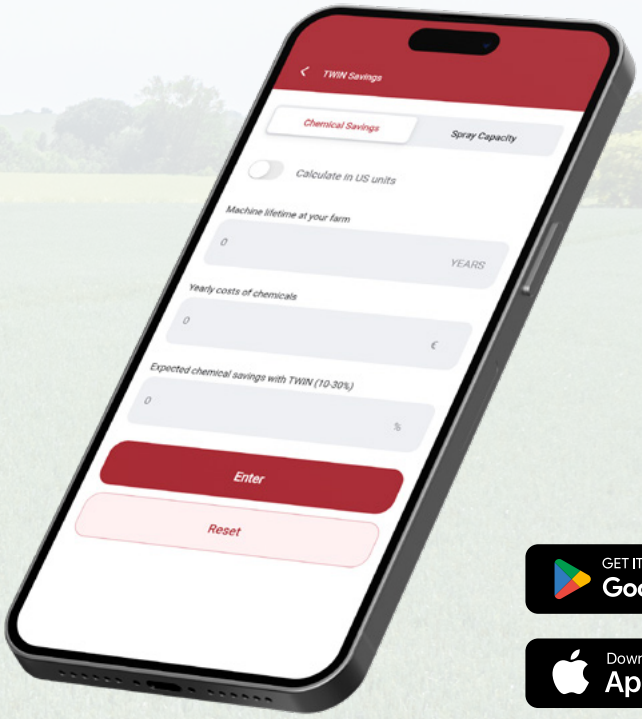
Save up to 30% on chemicals

Many trials throughout the years have shown a better chemical efficacy using TWIN. This gives the opportunity to adjust the chemical dose, and at some markets we see up to 30% reduction in chemicals consumption at the farm through the season.

At the next page we have setup to two examples of capacity gains and chemical savings with TWIN.

See how much you can reduce your chemical usage and improve your economy

– by typing in your numbers at: **www.myhardi.com** or in the **MyHARDI app**



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Download on the App Store

Example 1:

Gaining extra capacity with TWIN	Input
Your sprayed area in ha per year?	4500
Sprayer tank capacity in litres?	4500
Boom width in metres?	24
Time for filling, mixing and transport in hours?	0.5
Amount of water in l/ha – conventional?	240
Amount of water in l/ha – TWIN?	120
Driving speed in km/h – conventional?	8
Driving speed in km/h – TWIN?	12

Output at TWIN calculator		Output
Result – work rate ha/h	CONV:	12.6
	TWIN:	***20.7***
Result – hours per year	CONV:	357
	TWIN:	***217***
Result – your saved time in%:		***39.1***
Result – your extra capacity in ha per year:		***2885***
Result – Saved hours per year:		***140***

Use TWIN and save 140 hours/year (39%) or spray an extra 2885 ha/year using the same hours as conventional spraying.

Example 2:

Chemical savings with TWIN	Input
Machine lifetime at your farm – years?	7
Yearly costs of chemicals?	150,000
Expected chemical saving with TWIN? (10-30%)	30

Output at TWIN calculator	Output
Cost of chemicals in the period:	1,050,000
Result – You save in the total period using TWIN:	315,000
Result – You save per year using TWIN:	45,000

Test results proves: Worlds best application system

HARDI TWIN

Reduce up to 80% drift while saving up to 30% plant protection product – with more even coverage

Test proves HARDI TWIN is world's best application system

A test by Aarhus University in Denmark, using a HARDI COMMANDER TWIN FORCE sprayer, shows again the great advantages of active air spraying.

Minimising the environmental impact of spraying by lowering the consumption of plant protection product up to 30% – and reducing drift by an astonishing 80% at the same time – the TWIN boom will give you the best return on investment for your bank and climate accounts.

Very challenging conditions

The trial at the Flakkebjerg Test Center was made on bare ground and stubble to make the conditions as difficult as possible with a medium spray quality. Petri dishes mounted on small platforms were used as collectors to measure the sediments – and with a total of 15 runs per day with 45 petri dishes per run, a lot of data was collected.

The tests were made under a range of conditions, including high wind speeds of up to 6 m/s and driving speeds up to 16 km/h.

To compare the test as closely as possible to the German JKI tests, we used an ISO-LD 025 nozzle from HARDI with a 3 bar pressure. This delivered a medium sized spray droplet, very similar to that of the JKI reference nozzle. As the tests started, it was quickly discovered that the basic drift curve would be approximately 75% higher for the conventional boom driving at 8 km/h. The goal is always to keep the drift at a minimum, and for these tests, the drift should be less than 0.01% at 20 m distance from the end of the boom.

The results

The final results from the Flakkebjerg report speaks for itself. Using HARDI TWIN air assisted booms, you will get a more even deposit compared to conventional booms, while reducing your use of plant protection products by up to 30% – seen as the variation between the minimum deposit for the conventional boom compared to HARDI TWIN. This is for open crop or bare soil; in dense crop the result would be even higher.

Using the same nozzle, the same driving speed, and the under the same wind conditions, the HARDI TWIN system will reduce your drift by up to 80% compared to a conventional boom – and with even higher wind or driving speeds, you would see an even further reduction in comparable drift.

For countries like France and Netherlands, the HARDI TWIN system will always be in a higher drift reduction class. This is backed up by this test, showing that HARDI TWIN is always a class better.

So many reasons for buying HARDI TWIN booms

The TWIN air-assisted system was first developed for mist blowers back in the 1970s and 80s but quickly gained success with field sprayers. To compensate for wind conditions, the system allows the driver to angle the spray swath and adjust the air speed. It means the driver is able to reduce drift and achieve a much better penetration in dense crops – while at the same time being able to lower water consumption by hitting the target with a minimum of waste. This results in a lowering of the chemical usage by up to 30%. In combination with higher practical driving speeds and less filling, the total spraying capacity will increase by up to 100%.

Download the test results: twin.hardi.com

TRIAL OVERVIEW

- **Where:** Aarhus University – Flakkebjerg Research Center
- **Sprayer:** HARDI COMMANDER 4500 I 24 m TWIN FORCE
- **Trial done on:** Stubble and short grass
- **Nozzle:** ISO LD 025 – Spray pressure 3 bar
- **Working speed – volume rate:**
  - 8 km/h Conv & TWIN – 150 l/ha
  - 12 km/h Conv & TWIN – 100 l/ha
  - 16 km/h TWIN – 75 l/ha
- **Sedimentation drift following the German JKI protocol**
- **Low/normal wind speed:** 3-4 m/s
- **Higher wind speed:** 6-8 m/s

REDUCE DRIFT with HARDI TWIN UP TO **80%**

SAVE PLANT PROTECTION PRODUCT UP TO **30%**

- **Up to 100% more spray capacity**
- **Optimal field timing**
- **Better penetration in the crop**
- **Lower water consumption**
- **Faster spraying speeds**
- **More than 35 years' experience in TWIN**

Conclusion

Aarhus University – Science and Technology, Department AgroEcology Flakkebjerg, Author: Peter Kryger Jensen

- Spray deposition and spray drift from applications at two wind speeds were tested at 8 and 12 km/h with conventional technique and at 8, 12 and 16 km/h with Twin air-assistance.
- A 24 m trailed HARDI TWIN sprayer equipped with LD-025 nozzles at 3 bar pressure was used in the test.
- Deposit values under the boom were generally larger at the lee side compared to the wind side. The differences were most pronounced in the test at high wind speed, where the differences in deposition between wind side and lee side was especially large for the two conventional techniques.
- The most even distribution was found with TWIN at 8 and 12 km/h. Conventional technique at 8 km/h and 12 km/h gave the highest spray drift. The two TWIN applications at 12 and 16 km/h obtained significantly lower spray drift than the two conventional applications, but higher drift values than TWIN at 8 km/h. The spray drift measurements in the test showed a significantly lower drift from TWIN at 8 km/h compared to the other four techniques at both wind speeds.

Better penetration and coverage

While saving at least 50% water

Grass weed can be difficult to control, especially when using coarse drops. The movements in the plants caused by the air assistance and the fine droplets secure a high deposit on the grass weed.

Higher deposit on the target increases efficacy of the spraying and makes it possible to reduce the chemical rate.

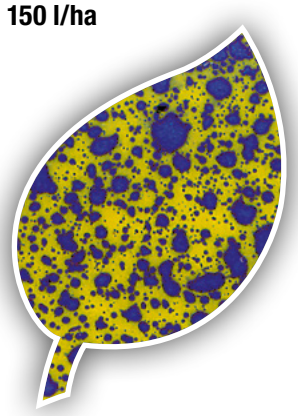
Excellent drift control with TWIN makes it possible to use smaller drops under a greater range of conditions.

With TWIN air assistance, lower water volumes will still maintain excellent coverage over all leaf surfaces.

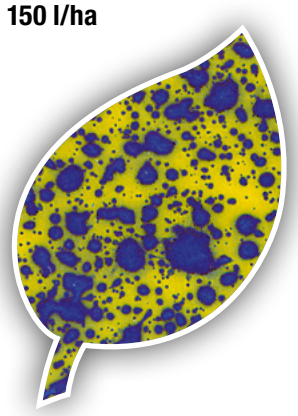
Typical broadacre users of TWIN are using 70 to 80 l/ha for all their products whilst high value crops such as vegetables and strawberries are at 150 to 300 l/ha.

TWIN provides massive savings in water haulage and time refilling compared to traditional spraying practices.

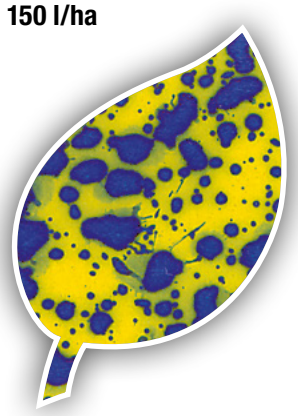
HARDI ISO F 110
150 l/ha



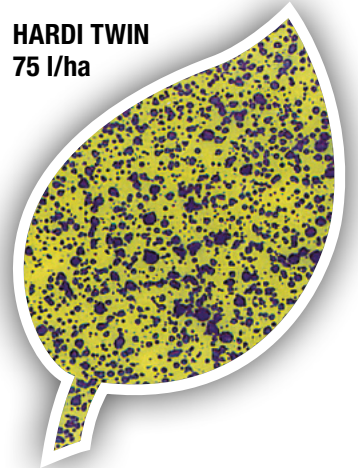
HARDI ISO LD 110
150 l/ha



HARDI INJET
150 l/ha



HARDI TWIN
75 l/ha



The blue colour shows the coverage on the weed

Crop opening effect

If nozzles with fine or medium spray quality are used on a conventional sprayer (without air assistance) the on-target deposit and coverage on the backside and in the upper area of the plant is higher. The finer droplets are ”hanging” in the air, meaning they need a longer time to reach the target area. This is proven in a lot of trials and can also be seen in video sequences. If there is a higher wind speed than the droplet speed, the smaller droplets are moved by the wind and the deposit and coverage gets higher on the wind side target area.

With TWIN air assistance there is a more even distribution on the whole plant. This is due to the fact that the plant is shaken by the air assistant and in this way is collecting droplets out of the air. The other effect is that fine and medium droplets are controlled by the air stream, and in this way they are safely guided towards the target, which ends up in a nice and even deposit and coverage over the full target area.

TWIN is the only air assisted sprayer with the patented possibility to angle air and liquid together in such a way that it is possible to counteract for wind direction and forward speed, without compromising on an even liquid distribution.

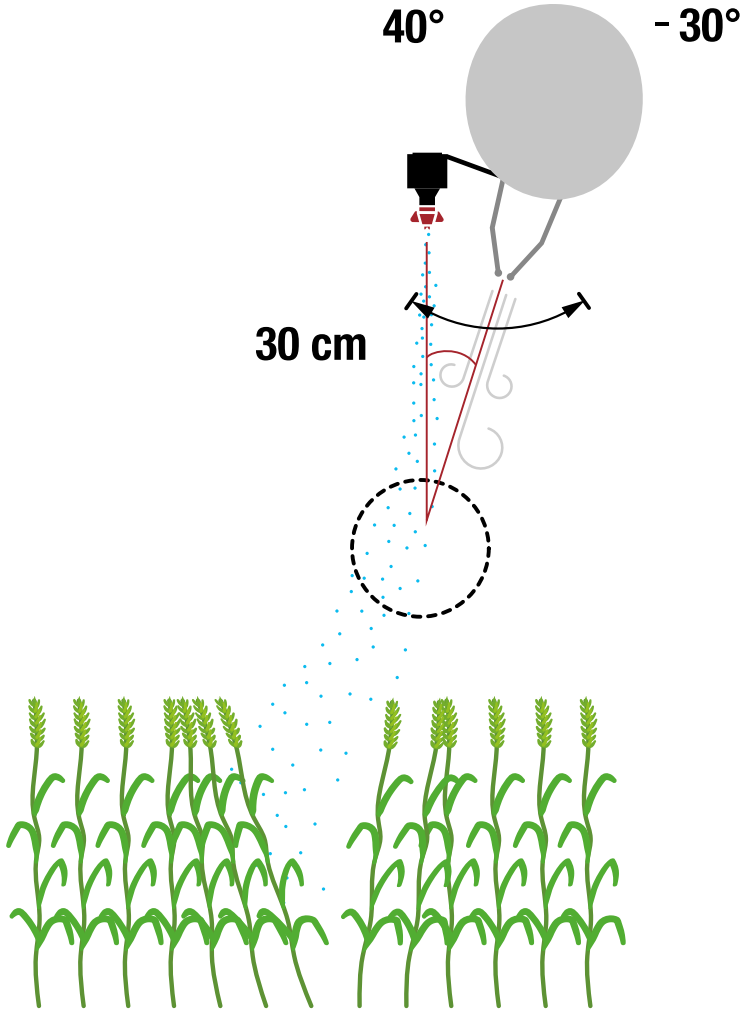
Drop sizes can be chosen independently of air speed and volume.

Drift tests have been carried out under a wide range of different conditions and over different crops proving a very high drift reduction efficacy.

Penetration studies in dense crops like potatoes show increased deposits deep in the crop as well as on the backside of leaves.

Penetration and deposition studies, and biological efficacy tests from many countries and in a wide range of different crops have proven the efficiency of the system.

Due to the very efficient drift control over both bare ground, low and developed crops, the TWIN sprayer has a very high capacity.



The angling of the air curtain together with the spray swath is a distinctive and important feature of the HARDI TWIN. This allows for more precise application depending on crop and weather conditions.

Drift reduction – a daily challenge

We constantly work for a better environment by developing technologies that reduce the amount of plant protection products needed and lead to fewer residues in food, drinking water and the environment

On an EU level, we constantly see new regulations regarding chemical registrations, risk assessments and drift reduction. The last of these getting a lot of attention as it seems the easiest area to improve – plus excessive drift is both visible and measurable.

From a farmer's point of view, where large areas must be treated in environmentally safe ways, it is vital to be aware of drift and pay close attention to the specific demands of each plant protection product – such as buffer zone, dosing, waiting times, etc.

Any spraying must also be done without generating negative contact with the non-farming community.

So, for the farmer, drift reduction is a must! In a lot of countries, most sprayers are now equipped with drift-reducing injector nozzles.

Based on this, drift reduction should no longer be a major issue. But we still have a lot of discussion and daily questions from dealers and farmers. The main reason is that the drift reduction demands are different in the different EU member states, making the whole issue highly complex.

What is spray drift?

According to ISO 22866, spray drift is the amount of sprayed material that does not reach the target due to the wind at the time of application. The drift quantity that is experienced will always be closely related to the prevailing wind speed.

In legislative terms, the field boundary is most important, as the field is the target.

Experts divide drift into sedimentation and airborne components. The sedimentation part can be measured on the ground close to the sprayed area, while the airborne drift is a cloud which moves upwards and settles further away. The sedimentation part is higher and closely related to the drift potential of the nozzle being used.

However the amount of drift is not so high that a farmer should expect a reduction in the efficiency of the applied product when spraying under good farming practices (wind speed 2 m above ground <5 m/s). For example, in the German drift curve the measured value 1 m away from the last nozzle is less than 1%.

Does every EU member state have its own drift reduction list?

No, but every member state does have regulations designed to limit drift and generally minimise the amount of pesticides being used. For example, Denmark and Sweden are copying the German JKI drift reduction list. However the Netherlands, Belgium, UK and France have their own list.

The major difference between each country is the reference drift curve, which has been defined in field drift trials.

In addition, the major risk zones can be different – most countries now measure drift up to 20 m away, but conduct the risk assessment in different ways.

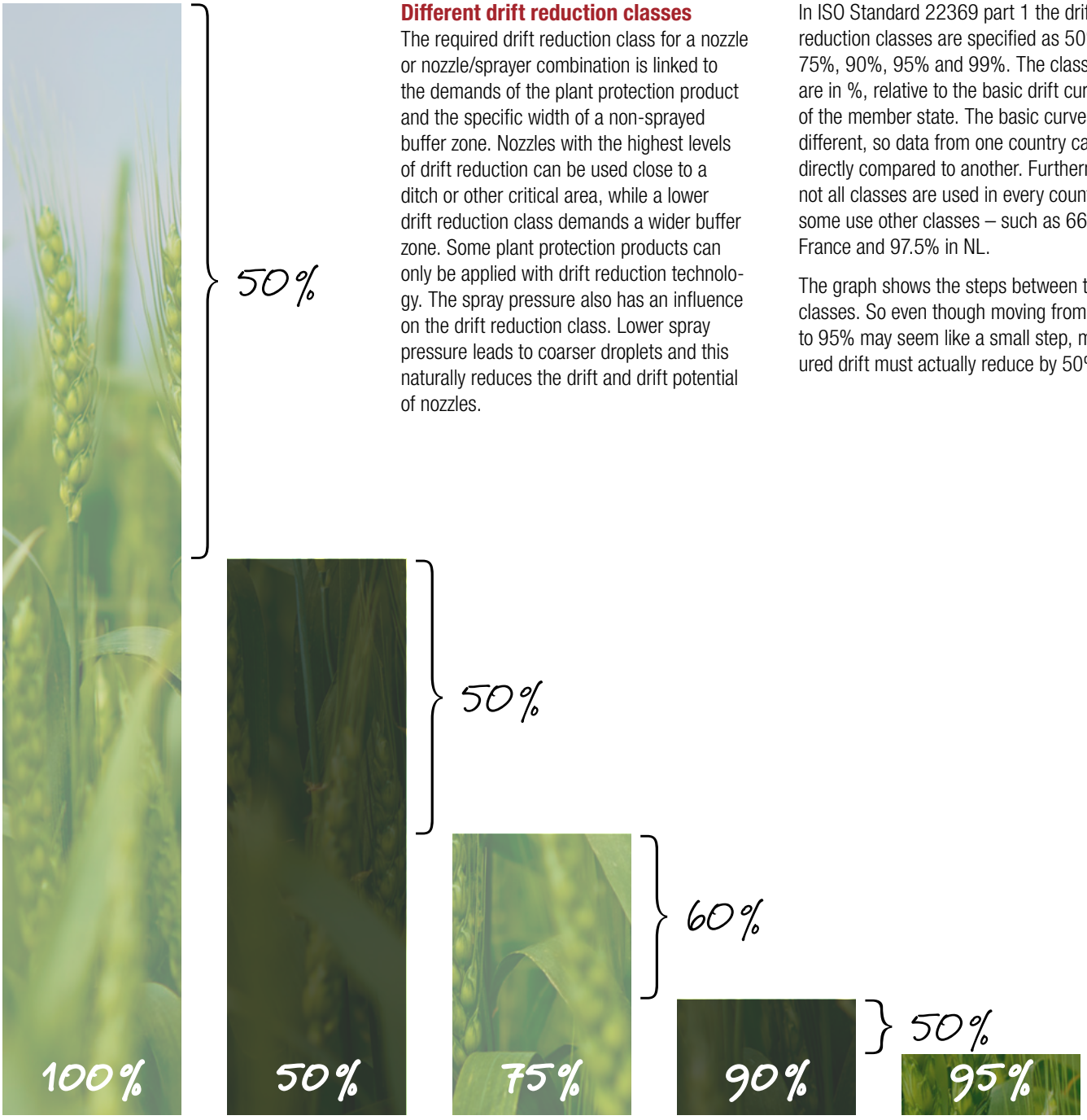
From a technical point of view, the drift and the drift potential of a specific nozzle should be the same. However field tests can be carried out over bare ground, short grass or a crop. All set-ups have specific challenges for the sprayer setting, especially when using HARDI TWIN sprayers, as covered in a separate article.

Wind-tunnel measurement

Today, most nozzles are tested using wind-tunnel drift tests. In these kinds of tests the drift potential of the candidate nozzle is measured, then compared to a reference drift curve. Wind-tunnel trials use a constant wind speed and the nozzle has an exact height and distance to the measuring equipment.

Field drift measurement set-up in different countries

Item/country	NL	DE	UK	FR	BE
Reference nozzle	XR 11004	FF11003	FF 11003	FF 11002	FF 11003
Spray pressure (bar)	3.0	3.0	3.0	2.5	3.0
Sprayed volume (l/ha)	300	180-240	120-240	110	180
Sprayer speed (km/h)	6.5	6.0-8.0	6.0-12.0	8.0	8.0
Boom height (m)	0.5	0.5	0.5	0.7	0.5



Different drift reduction classes

The required drift reduction class for a nozzle or nozzle/sprayer combination is linked to the demands of the plant protection product and the specific width of a non-sprayed buffer zone. Nozzles with the highest levels of drift reduction can be used close to a ditch or other critical area, while a lower drift reduction class demands a wider buffer zone. Some plant protection products can only be applied with drift reduction technology. The spray pressure also has an influence on the drift reduction class. Lower spray pressure leads to coarser droplets and this naturally reduces the drift and drift potential of nozzles.

In ISO Standard 22369 part 1 the drift reduction classes are specified as 50%, 75%, 90%, 95% and 99%. The classes are in %, relative to the basic drift curve of the member state. The basic curves are different, so data from one country can't be directly compared to another. Furthermore not all classes are used in every country and some use other classes – such as 66% in France and 97.5% in NL.

The graph shows the steps between the classes. So even though moving from 90% to 95% may seem like a small step, measured drift must actually reduce by 50%.

REGISTRATION PROCESS

A candidate nozzle needs to be tested to get a comparison and classification against the basic drift curve. This test can be done in a wind tunnel or as a field test – which takes extra time because specific conditions are demanded, and extra labour because each run produces a minimum of 60 samples and at least 6 runs are demanded. As a result, most companies conduct single nozzle tests in a wind tunnel.

If a candidate nozzle reduces drift it will be listed in the national journal of the member state and farmers will be able to purchase it. The different national lists can all be found online.

Drift reduction approval of HARDI TWIN FORCE

In most trials, internally and in independent institutes, the drift reduction is around 75% compared to the same application parameters of nozzle type, spray pressure, driving speed etc – the same settings with and without air, in other words. In fact the same sprayer is used and just the air is switched off, even though there could be a drift reducing effect from the airbag, especially at driving speeds above 10 km/h.

You will also see a higher drift reduction if fine and medium spray quality is used, but in drift reduction tests all comparisons are done against standard drift value curves.

Specific drift results with HARDI TWIN FORCE

As a TWIN FORCE sprayer doesn't fit into a wind-tunnel, expensive field-trials are needed. These always measure actual drift, and never just drift potential. But the resulting registration class can still vary between EU member states.

In the Netherlands, for example, nozzles in combination with TWIN FORCE will result in a higher drift reduction class.

TWIN FORCE reaches German 90% drift reduction class

In the last year the HARDI COMMANDER TWIN FORCE was tested at the German Julius Kühn Institut in Braunschweig.

For the drift reduction approval of a complete boom, a field drift trial was required and the "real" drift was measured. The result was than compared to the German basic drift value curve and classified. As an added challenge,Germany's basic curve is the lowest in Europe!

Drift reduction class	V-Number	Application number	Model	Use of Funds	Application areas	Applicant
90%	V36-07	G1544	HARDI COMMANDER TWIN FORCE 300 till 617, all with nozzle HARDI MINIDRIFT MD 03 and Endnozzle Lechler IS 80-03 POM.	Spraying pressure 1 bar, air flow rate 75-80% / fan speed 2400 rpm, angle position: 35-45% / 5 to 13°, minimum crop height 60 cm. Target area distance 50 cm.	A, G, R, Z	HAR

The TWIN FORCE boom with a HARDI MINIDRIFT 03 and asymmetric end-nozzle attained the 90% class. In the tests the volume rate was 120 l/ha, with 1 bar spray pressure and 7 km/h driving speed. The test was done over a 60 cm barley crop, which added difficulty as the nozzles were 110 cm above ground and the small drifting droplets needed longer to settle.

The MINIDRIFT 03 had previously qualified for Germany's 75% drift reduction class in wind-tunnel testing. So TWIN FORCE reduced drift by at least another 60% to reach the 90% class.

In this field trial an ISO-F 04 was used as reference nozzle, which in most cases represents the German basic drift curve, but under this higher boom height conditions the drift of the ISO-F 04 was higher than the basic curve. Using the ISO-F 04 in combination with TWIN FORCE air assistance achieved a 75% drift reduction.

50% reduction with fine spray quality

TWIN FORCE is still the only approved application system to achieve a 50% drift reduction with fine spray. Over the test crop it was used with an ISO-F 025 nozzle at a spray pressure up to 2.5 bar – the setting for 100 l/ha at 8 km/h.

With the ISO-F 04 and up to 3 bar spray pressure, the 75% drift reduction class was reached, which is the only setting with medium spray quality listed.

TWIN FORCE has more advantages

Drift reduction is not the only advantage of the TWIN FORCE system – active air assistance also allows spraying in more challenging wind conditions and at higher driving speeds. In addition, spray penetration, coverage and deposit are all improved in dense crops.

“It is important that the canopy is opened by the air, and that the active ingredients reach the stem of the crop and TWIN does that”

Meet Wolfgang Langehenke, Division Manager at Norika iin Kröpelin, Germany

Norika is one of the largest potato growers in Germany, with over 3200 hectares of total cultivation area and approximately 1500 hectares used for potato farming in Kröpelin, Germany.

Located near the Baltic sea, the Kröpelin region frequently faces windy conditions. For many years, Norika has used the HARDI TWIN FORCE to ensure the best performance to overcome the challenges

Hilly terrain, windy weather, but successful potato farming

Wolfgang says that one of the challenges for Norika is that the farms have very hilly terrain. And in terms of weather, it is often very windy.

"It's always windy here because of the proximity to the sea, which isn't easy when spraying. But of course, that's why we had the HARDI TWIN FORCE in operation before and have bought a new one now" says Wolfgang.

HARDI TWIN FORCE booms have air-assisted spraying with adjustable air curtains. This means that the spray job can be done even in windy conditions as the air-assisted spraying gives better precision and coverage. Compared to conventional booms, the TWIN FORCE boom reduces the drift by 80% as shown by many tests and research.

Precision and efficiency: Key benefits for Norika

Wolfgang explains that the spray mist with HARDI TWIN is pushed further down to the plant, which is a major benefit. This helps them use their time and resources better and improve both the effectiveness and cost-efficiency of their operations.

One of the issues Norika had been to minimise the risk of affecting the neighbouring areas with active ingredients. Wolfgang says that the plant protection products with TWIN are applied exactly where needed and the air-assisted spraying has made it more efficient.

Saving on water and chemical usage with TWIN

"We have been saving both in water and the chemical usage. Normally potatoes are sprayed with 400 liters of water. And with the size of our company and the logistics involved, we've gone almost 100 litres below in water usage. In terms of chemical usage, I would say that we are at 10% chemical saving range right now. This is possible because we have an air-supported sprayer with the HARDI TWIN," says Wolfgang from Norika.

Norika aims to minimise the environmental impacts

Norika operates under the motto of 'Farm to Fork'. Wolfgang explains that Norika aims to reduce the use of plant protection products as much as possible and optimise the potato through soil cultivation.

Wolfgang shares that grounds have potato beetles and they do not wish to remove them. In general, they choose to take preventative measures in soil cultivation rather than treating them as the end measure.

"*Just like humans, a potato that feels good is naturally less likely to get sick and is more resistant to environmental influences. So, the more optimal environmental conditionals are, the better and more resistant it is against other environmental influences,"* says Wolfgang.

Norika's outlook on the future of potato spraying cultivation

The future of plant protection in potato farming is all about precision, sustainability and efficiency. At Norika, Wolfgang highlights that effectiveness is key—after all, the treatment has to work.

"As consumers, we all want high-quality food produced with minimal environmental impact. That's why high technology will continue to gain acceptance. Farmers will continue to minimise the impact but at the same time, we also have to earn money somehow," says Wolfgang from Norika.

Coverage, deposit, penetration – key factors for a better plant care

Plant protection is a compromise with a lot of variability in the performance. Beside the weather conditions, the reaching of the spray target has a big influence on the result of a spray job

Different crops and grow stages, require different treatment. With fungicides – penetration and deposit is a very important factor, while for insecticides – coverage and penetration would often be required. With herbicides the crop stage has a big influence in dense crops, and for late spraying the penetration would be needed. But in most cases the deposit on vertical targets has the highest demand and here the droplet size and a vertical movement of droplets is required for a could result.

Interviews with experienced TWIN users, shows that their focus in herbicide application is often not the high reduction of plant protection products. For them the effect is the major interest, a good result is a clean field! To reach the best effect, also under difficult conditions, is their main argument to use a TWIN sprayer. With fine and medium spray-quality a nearly 100% control of grass weeds is the best efficiency you can reach. Results like these avoid a lot of trouble in the next years, especially in times with more and more problems with resistant and only using selective herbicides, a TWIN sprayer is an investment in the future.

Here the TWIN indicates the differences to conventional spraying clearly. As one customer said, better once in the best way – instead of two times with a poor result.

Spraying in mid-size crops

Deposits are mainly on the topside of the plants meaning less overall coverage.

To secure a good application, high water consumption is needed. In windy conditions there will also be a need for using nozzles making coarse droplets, to avoid drift. Trials show that conventional spraying at wind speeds of 1-3 m/sec is equal to 8-9 m/sec using TWIN air assisted spraying – if you want to keep the same droplet size.

Deposits on the underside of the leaves are a big challenge for spray technique especially in dense crops.

More than twice as much spray liquid was deposited on the underside of the leaves when using TWIN.

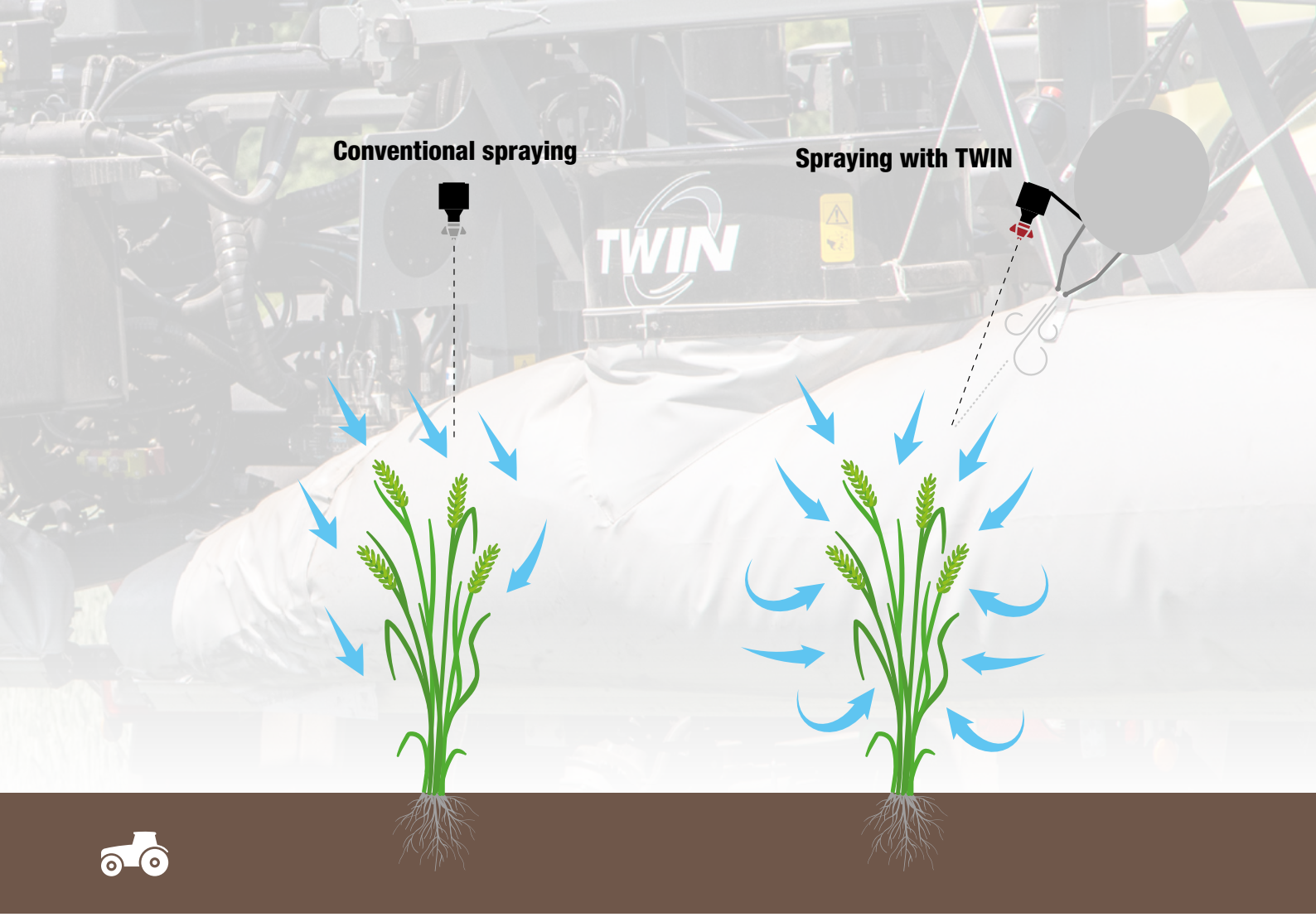
Deposit on the underside of the leaves has been measured in the upper and lower part of the canopy in % of the total deposit on the plant.

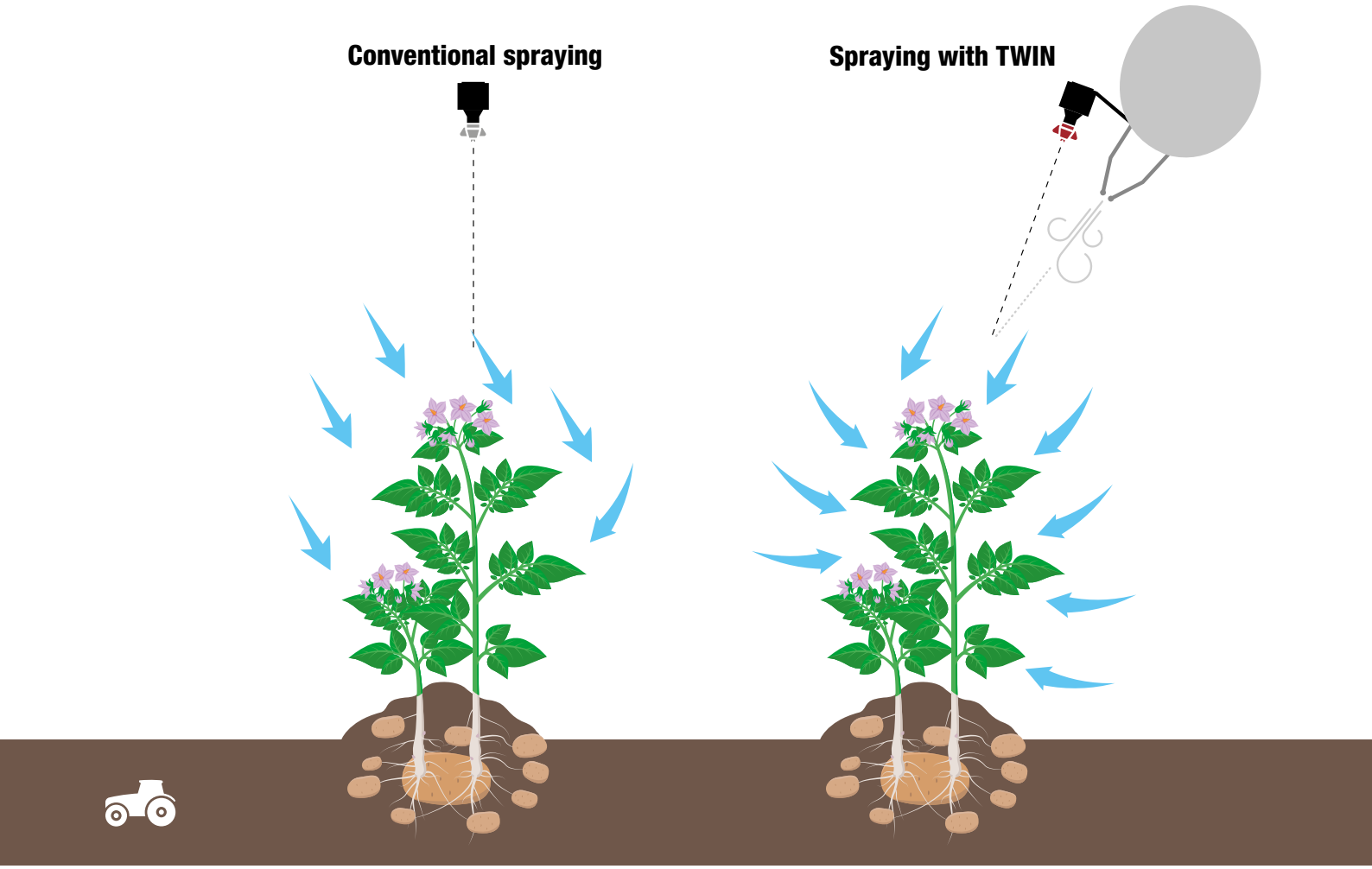
When fine/medium spray qualities are sprayed with conventional sprayers without air assistant, the deposit on the backside and in the upper area of the plant is higher. The finer droplets are hanging in the air.

If the wind speed is significantly higher than the droplet speed, the smaller droplets are moved by the wind and the deposit gets higher on the wind side.

With TWIN air assistance there is a more even distribution on the whole plant. This is due to the fact that the plant is shaken by the air and is collecting droplets out of the surrounding. In this case the droplets are controlled by the air.

This better and more even coverage can be seen in a lot of field trials and in video sequences in the HARDI spray laboratory.

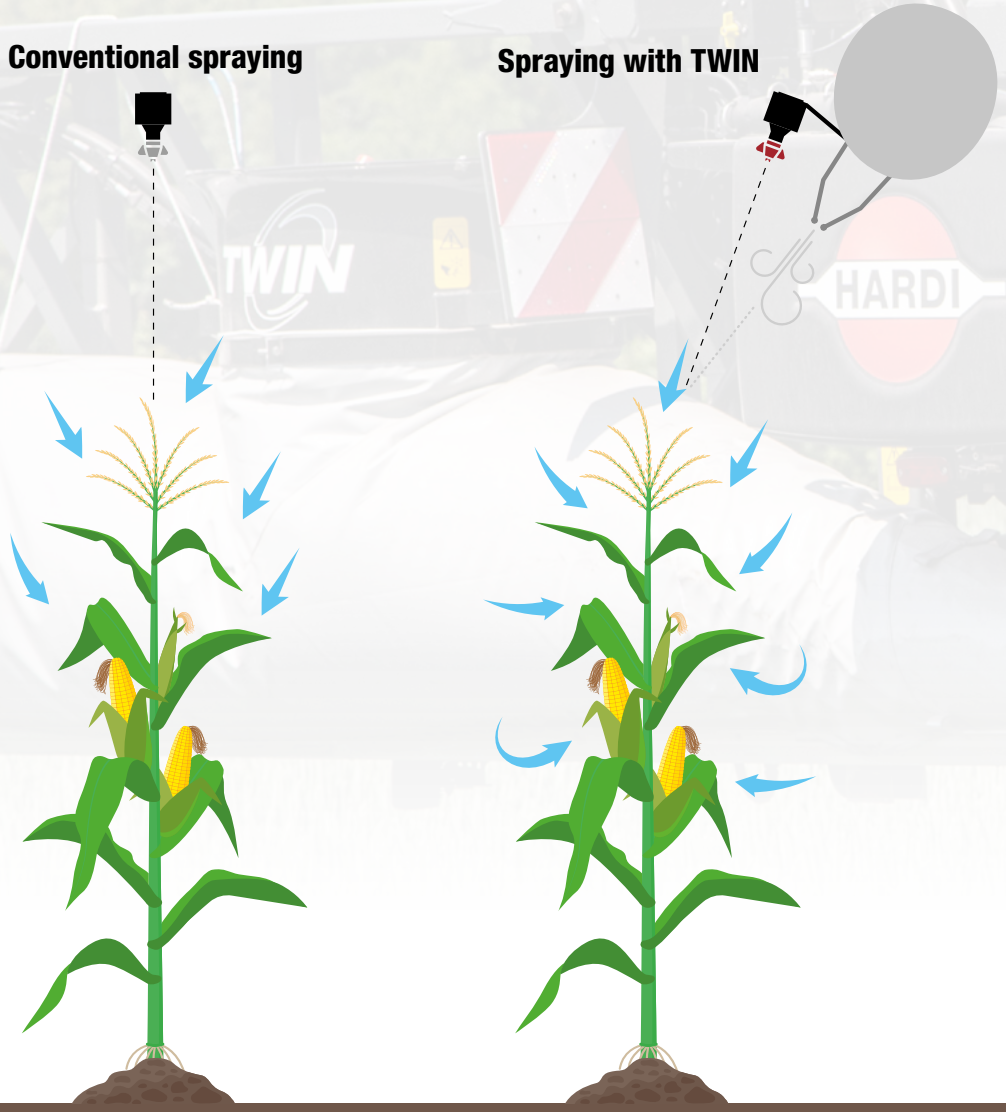

Conventional spraying
Spraying with TWIN


Conventional spraying
Spraying with TWIN

Spraying in high crops

TWIN air assistant reaches an excellent result in tall crops and that also in later growth stages. The air allows a far deeper penetration into the crop and the fine droplets gives a good coverage. Finer droplets also stay on the target area, where coarse droplets from conventional injector nozzles could run off or bounce down.

Especially on insecticide applications, fine droplets and a more even coverage give a better result. In late growth stages, it is often difficult to reach the target area. In corn, for example, the cob is deep in the crop and difficult to reach. Fungicide spraying in flowering oilseed rape needs to be deep in the canopy as the infections are on the raceme.

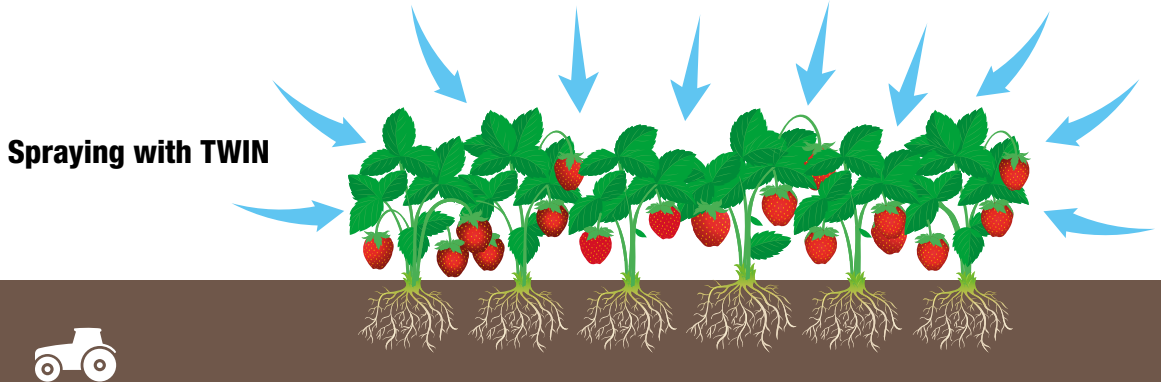


Spraying in dense crops

In dense crops, such as vegetables or potatoes, it is difficult to penetrate the crop. Coarse droplets from a conventional sprayer could penetrate deeper, but they cannot open the crop or lift leafs up.

With the unique angling of the nozzle/air system, a TWIN sprayer is able to open the crop and reach a good coverage on the underside of the leaf.

The crop opening effect can only be reached if the air comes in an angle towards the canopy. Vertical air would close the canopy and result in a high deposit just on top of the crop.



Less driver stress and better spray application

The ultimate in capacity, weather independence and application technology

Fully automatic boom control systems
The TWIN FORCE booms offers you the boom management system, AutoTerrain. Depending on the level chosen, the system can regulate, e.g. height, slant, tilt and yaw for superb boom stability and distinguish itself from others by preventing rather than correcting unintended boom movements. Using ultrasonic sensors on the boom wings and roll sensors at the centre, they monitor and correct the booms movements before the boom is disturbed.

A stable boom means less wear and tear on the sprayer as well as its operator. The sprayer will have a longer lifespan, and the operator will experience less fatigue and stress from having to constantly monitor the boom.

The AutoTerrain system has been tested under rigorous field conditions, showing excellent performance when spraying with low boom heights at high driving speeds of more than 15 km/h. When turning on the headland, the system will counter the booms natural pendulum tendency to dip on the inner side. The result is a level boom throughout the turn. AutoTerrain eliminates the risk of the boom hitting the ground.

The boom management systems secure the correct distance from spray nozzle to target, by that as well increase efficacy from the crop protection product applied to protect against diseases, bugs and insects.

Accurate and efficient application: Precise and uniform distribution, that help reducing under or over-application.

Reduced environmental impact: Prevent contamination by off-target spray drift.

Enhanced crop protection: Improve crop and yield potential by optimising the application.

Cost savings: Save time, money, and effort associated with excessive product use, waste, and reapplication.

Enhanced operator comfort: Provides a smooth driving experience increases productivity for the operator.

AutoTerrain
For more challenging field conditions

- Boom height
- Hydraulic slant
- Individual tilt of boom wings and NegativeTilt
- 5 ultrasonic sensors with integrated roll sensors
- Temperature-controlled proportional valves
- Optional extra on all booms

HARDI – Your Crop Care Partner

The acceleration of climate change and resource depletion poses a major challenge to meeting future food demand in a sustainable manner. At HARDI, our dedication lies in developing future-ready solutions that help our customers to maximise yield while reducing their environmental impacts.

Trusted by farmers worldwide, HARDI is renowned for high quality and well-designed machinery. You can rely on our products to achieve precise dosage and targeted applications with minimal drift and waste.

With over 60 years of experience behind us, HARDI INTERNATIONAL A/S remains a global trendsetter in the application of crop protection products. Head-quartered in Denmark, we are present in more than 100 countries through a network of subsidiaries, agents and importers.

Join us in practising sustainable agriculture as we work towards beneficial outcomes for both you and the environment.

For more information about our commitments, products, solutions and dealers | **hardi.com**

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