PREVENZIONE UMBRIA
onehealth

TARGETED PREVENTION PLAN FOR THE RISK OF OVERTURNING AGRICULTURAL VEHICLES

Regione Umbria

Regional Prevention Plan 2020/2025

INDEX

Targeted prevention plan summary

Tractors are one of the most used vehicles **in agriculture, both for transport or to reach the work area on roads/company roads or in the open field** as an operating machine and at a standstill as a tractor for equipment (wood splitter, circular saw, etc.); it is by far the vehicle most involved in rollover cases (45%).

Although the fleet of agricultural machinery in the regional territory is sufficiently up-to-date, especially in the geographical areas of the plains where monocultures prevail, we still too often witness serious and fatal accidents due to agricultural vehicle overturns. The determinant of such events is often the "human factor", understood as procedural errors or incorrect practices (e.g. improper use of agricultural equipment without preliminary assessment of the environmental risk factors). Furthermore, elderly workers or elderly people, are often involved, putting consolidated bad practices before the norms dictated by the standards and technical prescriptions of the manufacturers of the machines used.

In addition, the agricultural sector presents characteristics that make controls more difficult and less effective: the fragmentation of businesses, mostly small or very small in size, the increasingly large presence of self-employed workers (with risks of interference with working procedures), the high turnover of the workforce, seasonality of work, large use of foreign labor, age of the working population, the presence of workers employed irregularly (part-time or voucher work, to the detriment full-time paid employment).

These factors can undermine the effectiveness of controls based on case-by-case interventions, also when considering the continuous change in risk situations, making it necessary to search for effective strategies across the entire sector. Studies show that the smaller the size of a company is associated with a lower adherence to company rules and procedures.

There are often training gaps, less contact between companies and control bodies. There may also be an information gap with respect to support initiatives and control analyses.

Therefore, and in light of the objectives of the "PP07 Prevention in Construction and Agriculture Programme", we intend to implement structured control and support strategies, such as the Targeted Prevention Plan (TMP).
Through the TMP, companies are involved in a process that combines support activities - understood as real involvement of companies - and control actions for the prevention of accidents and professional illnesses, with the ultimate goal of gradually raising the level of prevention and safety measures in the sector as a whole.
It is of fundamental importance to support employers in the process of self-assessment regarding the level of safety in the company.

In the implementation of the TMP it is necessary to involved all players, including the Regional Coordination Committee, pursuant to art. 7 Legislative Decree 81/2008.

Goals

The Targeted Prevention Plan involves agricultural companies in the Umbrian territory through a process of self-evaluation and improvement, it aims to address the risk of vehicle overturns, reducing the most serious and mortal accidents.

Protocol

The TMP requires that occupational risks or critical issues underlying the dynamics of accident occurrence, especially serious and fatal ones, be identified. Then the WORKING ENVIRONMENT PREVENTION AND SAFETY SERVICES (PSAL) of the local health authorities in agreement with the trade associations defined the measures to prevent the risks and adopted it as good practices.

The companies are then invited to attend public seminars and to evaluate their action on the topics discussed by completing a specific form to be returned to the PSAL Services of the Local Health Units.
In the subsequent phase, controls will be carried out in a sample of companies.

In summary, the TMP follows the phases set out below:

1. Elaboration of the document "Good practices to prevent the risk of agricultural vehicleoverturn " and the self-assessment form for companies. The document was prepared by the Working Group made up of PSAL Services, USL Umbria 1 and USL Umbria 2 personnel, established pursuant to Management Resolution no. 2605 of 03/14/2022;
2. Participation and sharing of the above documents with the stakeholders (trade associations) interested in the project and acquisition of observations/suggestions/reflections;
3. Presentation of the TMP and the tools produced to the Regional Coordination Committee for health and safety in the workplace, according to art. 7 Legislative Decree 81/2008;
    - Points 1), 2), 3) by December 2022
4. Annual report on the project (by January 2023);
5. Preparation of the informative letter about the TMP, with the above documents attached, to be sent to the selected local agricultural companies;
6. Training seminars for agricultural companies;
7. Verification by the PSAL Services of the data reported in the self-assessment and data processing forms;
    - Points 5) 6) 7) by 2023
8. Annual project report (by January 2024)
9. On-site control in a sample of companies to verify the application of the good practices set out in the document noted above;
    - Point 9): years 2024-2025
10. Annual report on the project (by January 2025);
11. Drafting of the final report with results to be presented to stakeholders (by January 2026).

Good practices to prevent the risk of agricultural vehicle overturns

When using agricultural vehicles the risk of overturning is always very high, withcritical risks being:

- failure to use correct procedures that take into account the factors most **common linked to the risk of overturning such the condition of the vehicle and its use**;

- absence/failure to use the necessary protective devices (driver protective structures and seat belts);
- grip of tires on different ground surfaces is another critical element. As an example, the adhesion coefficient of a wheeled tractor on a dirt road is 0.60, on a seedbed it is 0.25.

A rollover accident can occur in various ways:

Lateral lying

Lateral lying means a vehicle turned on its side which accounts for 75% of rollover cases.

Some precautions can be taken to avoid this type of accident:

- follow the direction of the maximum slope whenever possible, avoid crossing the slope;
- avoid holes, depressions, ditches whenever possible;
- avoid climbing over trunks or rocks that could cause the machine to lose balance;
- cantilevered equipment must always be kept uphill of the machine;
- avoid dangerous maneuvers such as sudden steering or braking;
- when going downhill you must use the engine brake, engaging the gear you would use to go uphill before tackling the slope to prevent acceleration of the tractor and avoid using the mechanical brake alone.

If lateral lying occurs several times consecutively, causing the tractor to turn more than 180°, it is called continuous rolling.

Wheelie and front rollover

Wheelies and front overturns refer to situations of instability relating to the direction of travel and represents 25% of cases of overturning, involving the loss of front or rear wheel grip, leading to tractor overturns.

Some precautions can be taken to avoid this type of accident:

- when towing heavy loads it is always a good idea to add weight to the front of the vehicle as a counterbalance;
- loads must be towed using exclusively the bar approved by the manufacturer, appropriately fixed to the tow hook;
- when traveling up a slope, always keep the load uphill;
- never use the tractor with the clutch disengaged or with the gear in neutral.

Lateral lying

Wheelie

Front reversal

Measures to prevent the risk of overturns

This document focuses on the prevention of the risk of tractor overturns, the vehicle most associated with such accidents.
However, the use of other self-powered machinery on wheels such as harvesters, tobacco harvesters and self-propelled sprayers is also associated with the same risks as tractors.

Safety devices

All agricultural and forestry tractors must be equipped with safety devices capable of minimizing
the consequences of a possible accident.
In particular:

- driver protection structures in case of overturns, to guarantee a safe space for the driver, thiscan be of two types:

- closed cabin
- chassis with two **uprights** positioned in front or behind the driver's seat, generally with partial or total folding, or with four uprights;

- seat belt for the driver's seat and for any passenger seat

Approval of the protection structure is mandatory. Tractosr cannot be sold or registered if not in compliance with this provision.

Approval details must be shown on the chassis or cab, on a riveted or glued plate, placed in a plain sight.

Tractors without these devices can be adapted according to the Guidelines set-out by INAIL in 2014, which identify the construction requirements of the protection devices in the event of overturns, relevant instructions and procedures are provided for the construction and application of agricultural or forestry tractors already placed on the market for the following categories:

1. narrow-track wheeled tractors;
2. standard wheeled tractors;
3. caterpillars.

A certificate of conformity must be issued by the manufacturer of each protective structure to certify its compliance with the technical indications given in the INAIL Guidelines (Annex III). The user must keep the certification on-hand, together with a declaration of correct installation of the protective e structure, drawn up by the installer (Annex IV).

For the purpose of fulfilling road traffic requirements, it is not obligatory to update the tractor's registration certificate **following the installation** of a protective structure

When retrofitting an agricultural tractor by installing the above devices, a **declaration of conformity** by the manufacturer and the installer must be obtained. These declarations must be retained.
The declarations of correct installation, according to the INAIL Guideline, can be signed by the authorized workshops or by the agricultural company itself, which in this case will appear and respond as the installer.

In the event that the tractor is approved and equipped with a protective structure from the outset, but has had it removed, the installation of a new structure needs to meet the requirements set out in the INAIL guideline. is permitted only if the original protective structure, is no longer commercially available.

The declaration of commercial non-availability of the original protective structure (Annex V) must be requested from the tractor manufacturer or one of it's "representatives" such as the retailer.

A protective structure is considered commercially unavailable if the above declaration is not produced by the tractor manufacturer within 30 days of the request or if expressly indicated in the official spare parts catalog of the tractor manufacturer. In this case it is necessary for the user to sign a commercial unavailability declaration in lieu of an affidavit pursuant to Article 47 of Presidential Decree 445 of 28 December 2000 (Annex VI).

Only authorized workshops, pursuant to law no. 122 of 5 February 1992 which regulates self-repair activities, can install ROPS protection devices: there is a register of companies carrying out self-repair activities and onlythose registered can perform this activity.
In derogation of law no. 122, 5 February 1992, Legislative Decree no. 9, 29 March 2004 provides, in art. 14 paragraph 12, that farms with specific workshops can equip their tractors with the safety devices in question, strictly following the INAIL guidelines.

Training

To drive the tractor, or other agricultural equipment among those indicated in the State-Regions Agreement of 22 February 2012, a specific **operator qualification** is required and can be obtained through participation in an 8-hour theoretical and practical course for wheeled or caterpillar tractors. To obtain the qualification for all types of tractors, there is a 13 hours course.
The above qualification must be updated within 5 years from the date of issue of the certificate.

Technical annex use and maintenance manual

All agricultural tractors/agricultural machines are provided with the registration certificate, the technical annex and the use and maintenance manual, wherein the manufacturer illustrates all the information necessary to obtain better performance and work safely.
The use and maintenance manual and the technical annex must be provided upon purchase by the manufacturer, dealer or private seller, even if the equipment is used.

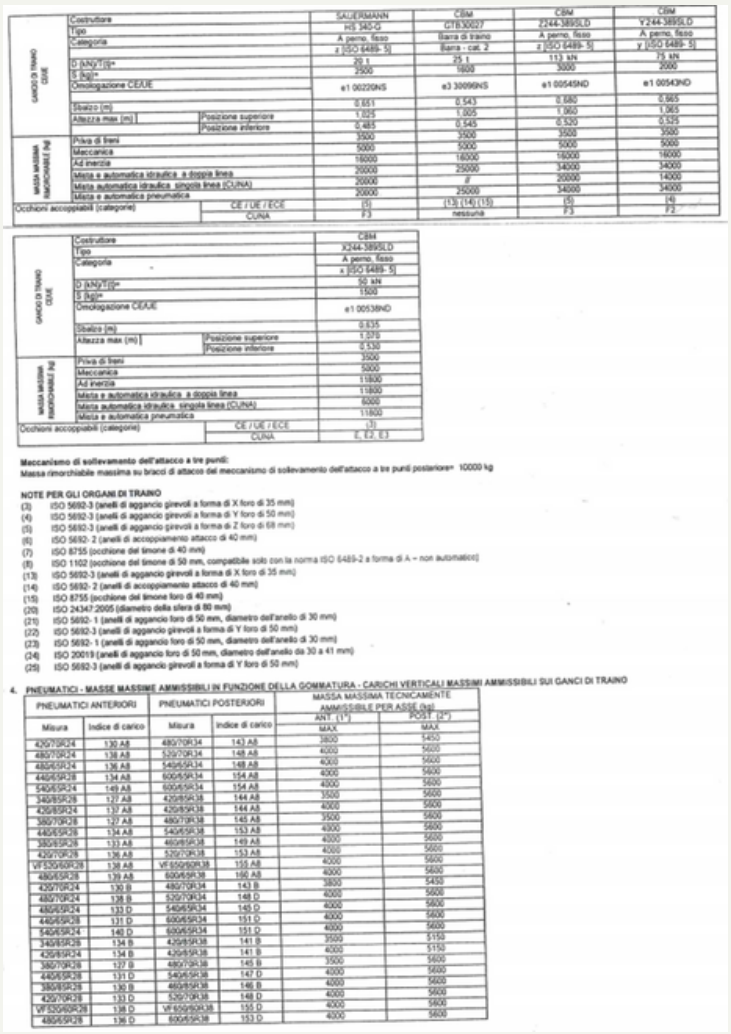
For example, the technical characteristics of the tires that can be fitted, to safely carry out the various processes, are indicated.
If the use and maintenance manual and the technical annex are not sufficient to clarify the problem related to the maintenance and repair of the machine, you should not hesitate to consult the dealer and/or the manufacturer. Other useful documents such as technical (or workshop) manuals and spare parts catalogs are available upon request from these entities.
It must be kept in a well-known and easily accessible place for easy consultation.

At the time of purchase **carefully read the use and maintenance manual and the technical annex** and consult them whenever doubts arise regarding use of the equipment or if you are about to carry out maintenance or repairs on the vehicle.

EXTRACT OF TECHNICAL ANNEX with information regarding the type of tires that can be used, towable mass, tow hook, applicable ballast and more

Maintenance

The vehicle must undergo regular maintenance, to be carried out as indicated in the use and maintenance manual.



			SAUERMANN	CBM	CBM	CBM
GANCIO DI TRAINO CEE/UE	Costruttore		HS 340-G	GTB30027	Z244.389SLD	Y244.389SLD
	Tipo		A perno, fisso	Barra di traino	A perno, fisso	A perno, fisso
	Categoria		x [ISO 6489- 5]	Barra - cat. 2	z [ISO 6489- 5]	y [ISO 6489- 5]
	D [kN/T][l]*		25 t	25 t	113 kN	75 kN
	S [kg]*		2500	1600	3000	2000
	Omologazione CEE/UE		e1 0022GNS	e3 3009GNS	e1 0054SND	e1 0054SND
	Sbalzo [m]		0,651	0,543	0,680	0,665
	Altezza max [m]	Posizione superiore	1,025	1,005	1,060	1,065
		Posizione inferiore	0,485	0,545	0,520	0,525
MASSA MASSIMA RIMORCHIABILE [kg]	Priva di freni		3500	3500	3500	3500
	Meccanica		5000	5000	5000	5000
	Ad inerzia		18000	18000	18000	18000
	Mista e automatica idraulica a doppia linea		25000	25000	34000	34000
	Mista automatica idraulica singola linea (CUNA)		20000	#	20000	14000
	Mista e automatica pneumatica		20000	25000	34000	34000
Occhioni accoppiabili (categorie)		CE / UE / ECE	(5)	(13) (14) (15)	(5)	(4)
		CUNA	F3	nessuna	F3	F2

			CBM
GANCIO DI TRAINO CEE/UE	Costruttore		X244.389SLD
	Tipo		A perno, fisso
	Categoria		x [ISO 6489- 5]
	D [kN/T][l]*		50 kN
	S [kg]*		1500
	Omologazione CEE/UE		e1 0053IND
	Sbalzo [m]		0,635
	Altezza max [m]	Posizione superiore	1,070
		Posizione inferiore	0,530
MASSA MASSIMA RIMORCHIABILE [kg]	Priva di freni		3500
	Meccanica		5000
	Ad inerzia		11800
	Mista e automatica idraulica a doppia linea		11800
	Mista automatica idraulica singola linea (CUNA)		6000
	Mista e automatica pneumatica		11800
Occhioni accoppiabili (categorie)		CE / UE / ECE	(3)
		CUNA	E, E2, E3

Meccanismo di sollevamento dell'attacco a tre punti:
Massa rimorchiabile massima su bracci di attacco del meccanismo di sollevamento dell'attacco a tre punti posteriore= 10000 kg

NOTE PER GLI ORGANI DI TRAINO
(3) ISO 5692-3 (anelli di aggancio girevoli a forma di X foro di 35 mm)
(4) ISO 5692-3 (anelli di aggancio girevoli a forma di Y foro di 50 mm)
(5) ISO 5692-3 (anelli di aggancio girevoli a forma di Z foro di 68 mm)
(6) ISO 5692- 2 (anelli di accoppiamento attacco di 40 mm)
(7) ISO 8755 (occhione del timone di 40 mm)
(8) ISO 1102 (occhione del timone di 50 mm, compatibile solo con la norma ISO 6489-2 a forma di A – non automatico)
(13) ISO 5692-3 (anelli di aggancio girevoli a forma di X foro di 35 mm)
(14) ISO 5692- 2 (anelli di accoppiamento attacco di 40 mm)
(15) ISO 8755 (occhione del timone foro di 40 mm)
(20) ISO 24347:2005 (diametro della sfera di 80 mm)
(21) ISO 5692- 1 (anelli di aggancio foro di 50 mm, diametro dell'anello di 30 mm)
(22) ISO 5692-3 (anelli di aggancio girevoli a forma di Y foro di 50 mm)
(23) ISO 5692- 1 (anelli di aggancio foro di 50 mm, diametro dell'anello di 30 mm)
(24) ISO 20019 (anelli di aggancio foro di 50 mm, diametro dell'anello da 30 a 41 mm)
(25) ISO 5692-3 (anelli di aggancio girevoli a forma di Y foro di 50 mm)

4. PNEUMATICI - MASSE MASSIME AMMISSIBILI IN FUNZIONE DELLA GOMMATURA - CARICHI VERTICALI MASSIMI AMMISSIBILI SUI GANCI DI TRAINO

PNEUMATICI ANTERIORI		PNEUMATICI POSTERIORI		MASSA MASSIMA TECNICAMENTE AMMISSIBILE PER ASSE (kg)	
				ANT. (1*)	POST. (2*)
Misura	Indice di carico	Misura	Indice di carico	MAX	MAX
420/70R24	130 A8	480/70R34	143 A8	3800	5450
480/70R24	138 A8	520/70R34	148 A8	4000	5600
480/65R24	136 A8	540/65R34	148 A8	4000	5600
440/65R28	134 A8	600/65R34	154 A8	4000	5600
540/65R24	149 A8	600/65R34	154 A8	4000	5600
340/85R28	127 A8	420/85R38	144 A8	3500	5600
420/85R24	137 A8	420/85R38	144 A8	4000	5600
380/70R28	127 A8	480/70R38	145 A8	3500	5600
440/65R28	134 A8	540/65R38	153 A8	4000	5600
380/85R28	133 A8	460/85R38	149 A8	4000	5600
420/70R28	136 A8	520/70R38	153 A8	4000	5600
VF520/60R28	138 A8	VF650/60R38	155 A8	4000	5600
480/65R28	139 A8	600/65R38	160 A8	4000	5600
420/70R24	130 B	480/70R34	143 B	3800	5450
480/70R24	138 B	520/70R34	148 D	4000	5600
480/65R24	133 D	540/65R34	145 D	4000	5600
440/65R28	131 D	600/65R34	151 D	4000	5600
540/65R24	140 D	600/65R34	151 D	4000	5600
340/85R28	134 B	420/85R38	141 B	3500	5150
420/85R24	134 B	420/85R38	141 B	4000	5150
380/70R28	127 B	480/70R38	145 B	3500	5600
440/65R28	131 D	540/65R38	147 D	4000	5600
380/85R28	130 B	460/85R38	146 B	4000	5600
420/70R28	133 D	520/70R38	148 D	4000	5600
VF520/60R28	138 D	VF650/60R38	155 D	4000	5600
480/65R28	136 D	600/65R38	153 D	4000	5600

If it is indicated that certain maintenance and/or repair operations must be carried out by specialized personnel at an authorized workshop, DO NOT carry out do-it-yourself interventions.

To prevent overturns particular attention must be paid to:

Tires and wheels

Tires are parts subject to wear, aging and breakage.

It is necessary to periodically check the conditions, the state of wear of the ribs and/or the presence of cuts or incisions in the tread, the integrity of the sidewalls and the onset of anomalous swelling. All this denotes a deterioration of the casing with consequent risk of explosion.

The wheel rims must not show any deformations. All bolts securing the wheel to the axle shaft flange must be mounted and tightened correctly.

Ballast: it must be considered that the equipment carried and **semi-carried** at the rear of the tractor, during the lifting and transport phase, always causes a lightening of the front axle of the tractor. This lightening, in the absence of adequate front ballast, can lead to a loss of stability of the tractor with consequent possible longitudinal overturns of the tractor-operating machine complex (wheelie). The weight of the ballasts must be evaluated based on the tables provided by the manufacturer in the technical annex depending on the weight transported at the rear.

Brakes

The behavior of agricultural machinery in traffic situations is very different from that of cars, as the loads involved are much greater and road holding is not always perfect. It is therefore necessary to periodically check the efficiency of the brakes, with particular attention to the regularity of braking.

If long braking, skidding, bouncing, etc. occur. it is necessary to have the braking components adjusted and/or replace the worn devices (pads and/or discs).

For correct operation with towed equipment and trailers with a mechanical braking system, it is always necessary to install and use the relevant control, usually located to the right of the driver's seat, connecting it correctly with the relevant steel cable to the braking element of the trailer.

Installation and use of the **trailer brake control** is one of the most neglected operations in agricultural practice.

Considering the braking performance of the tractor alone is very risky as with the same initial speed, the stopping distances of the trailer made up of the tractor and the operator without trailer braking double.

Risk assessment document (if it is a company with employees or equivalent workers)

The specific risk of overturns must be assessed in the Risk Assessment Document (DVR), taking into account the numerous elements that come into play in determining the occurrence of the most dangerous situations, in particular:

- the characteristics of the agricultural vehicle and the connected equipment: for example, the agricultural tractor has a very high center of gravity compared to the support base, it is generally not equipped with suspensions, elements that favor instability;
- the characteristics of the soil: soft ground (banks, ditches, unstable surfaces) holes, depressions or ditches
- the type of work carried out and the means of movement of the vehicle: for example, the presence of high rear or front overhanging loads or the inertia of towed machines or the need to carry out sudden maneuvers such as turning towards the valley.

Obviously, the situation becomes even more critical if you are working on steep slopes where the tractor's center of gravity could easily leave its support base, causing it to overturn.

The DVR should be a representation of different possible working conditions and the preventative procedures to be adopted. The safety procedures for the use of tractors attached to the DVR must include suitable checks by those in charge, also to verify the effective use of the driver retention systems, providing adequate signage inside the warehouses where the agricultural vehicles are placed which highlights the obligation to use the seat belt.

Safety pills

WHAT TO DO

- drive the tractor only if you are trained to do so, and instructed for both on and off the road, only use tractors equipped with a cab that has anti-tip protection devices and seat belts;
- before each start, check that the protection system (arch and roll-bar) is in the raised position and **fasten your seat belt**; remember that a protective structure is not sufficient if your fastened seat belt is not fastened;
- evaluate the geomorphological characteristics of the land in advance, in particular:
  - slope of the land;
  - pay attention to steering turns and the stability of banks and drains;
  - variability of the terrain in relation to climatic conditions;
  - particular risk conditions such as ditches, obstacles, holes, depressions, waterways;
- use a tractor that has the mechanical characteristics suitable for the type of work to be carried out;
- guarantee that the operating speed is such as to maintain the necessary safety in relation to the conformation of the land on which you are working, such as a slope or slope instablity land;
- always check that the load is securely tied to the floor;
- pay particular attention during maneuvers, especially when there is not full visibility;
- when you drive the tractor, you must always know where all your family members and collaborators are;
- uses the "safe stopping" procedure of the tractor and pay particular attention if the tractor is stopped on an uphill slope;
- keep all screens and protections installed and apply signs and reflectors to towed accessories;
- guarantee regular maintenance by using spare parts with adequate characteristics, using authorized workshops for extraordinary maintenance;
- keep a first aid kit and a dry powder fire extinguisher in the tractor.

WHAT NOT TO DO

- do not operate on tractors that do not meet safety requirements;
- do not use the tractor without wearing your seat belt ;
- do not travel on terrain with a slope close to overturning limits;
- never load the platform beyond the capacity foreseen by the manufacturer;
- do not tow excessive loads using unbraked devices and never transport people together with livestock, crops or other materials
- do not attach chains, cables, etc. to the safety frame for towing, as this can cause the tractor to overturn; always use the tow bar; do not leave the power take-off connected when not in use;
- do not leave the key in the ignition;
- do not start or maneuver the tractor without being in the drivers seat;
- do not leave the tractor engine running when carrying out activities on the ground or on the tractor;
- never allow anyone to get on the tractor as a passenger, unless the tractor is approved for the purpose (in general, tractors that can carry one or two passengers are also equipped with the relevant seats and seat belts);
- never refuel with the engine running;
- do not replace the wheels (rims and/or tyres) with others of a different size not foreseen in the registration document.

Prima di cominciare a usare il trattore è importante controllare che:

- tire pressure is adequate, to reduce the risk of overturns;
- the steps are clean and dry, to reduce the risk of slipping and falling;
- the transmission oil is adequate to protect the transmission system;
- the handbrake is working, to reduce the risk of the tractor skidding/rolling and crushing someone;
- hydraulic oil and lines are in good condition, to reduce the risk of equipment malfunction;
- the cab floor is clean, to reduce the risk of foreign objects obstructing the pedals;
- all windows are clean, to ensure good visibility;
- the brake pedals work, to be able to stop the tractor immediately if necessary;
- the quantity of water in the radiator is adequate, to prevent the engine from overheating;
- the lights and mirrors work correctly, to promote safe driving;
- the engine oil level is adequate to protect the engine.

The "safe shutdown" procedure:

1. Stop the tractor in a safe place.
2. Disengage the gearbox and gears.
3. Activate the hand brake.
4. Place the tools on the ground.
5. Turn off the engine and remove the keys.

Competenze e comportamento umani:

If you use a vehicle for agriculture work you must:

- be in possession of a valid driving license for the category of the vehicle driven;
- be able to make the journey and therefore DO NOT:
  - take drugs/substances that cause drowsiness; use the vehicle if you are sleepy or sick;
  - drink alcohol;
  - have tight time constraints (avoid rush hours);
- respect the highway code;
- have prudent driving behavior;
- maintain concentration while driving;
- adapt driving to road conditions;
- be careful of other road users;
- always keep your seat belt fastened;
- use your cell phone or other communication systems only with speakerphone;
- drive with the lights on where necessary;
- keep the vehicle doors closed and locked.

Emergencies:

In emergency situation such as a breakdown or collision:

- try to stop the vehicle in a safe place;
- in the event of a collision , if there are injured people, call the national emergency number;
- contact your roadside assistance service;
- if necessary, inform your employer;
- wear a high visibility jacket, secure the area if possible and make sure you are in a safe place.
- do not try to handle the situation alone if it is too difficult or challenging for one person to handle: for example, a vehicle stuck in mud.

INJURIES

Case 1

Context

The accident occurred during the olive harvest on a plot of land made up of several terraces approximately 6 meters wide.

To carry out this activity, a tractor-trailer was used, a compressor connected to the power of the tractor itself was located on the rear trailer. The compressor was used to convey compressed air through a plastic tube into the mechanism of a pneumatic plastic rake (olive harvester) the vibrations make the olives fall onto a net spread under the foliage of the plant; the olives were then manually collected from the net and placed into boxes. These actions were repeated plant by plant and each time the tractor with the compressor was moved and the plastic net was spread under the plant.

How the injury occurred

While the agricultural worker was moving the tractor to position it under a different plant, the vehicle deviated from the direction of travel, overturning on the cliff and falling onto the lower terrace. The worker was thrown out of the vehicle and crushed by the tractor.

What factors led to the accident?

The accident was caused by the following factors:

- an incorrect maneuver that brought the tractor too close to the edge of the terrace;
- the wheels went over the edge and the vehicle overturned on the lower terrace;
- the driver did not have a specific driver's license or training for driving agricultural and forestry tractors;
- the driver also lacked adequate training – (State-Region Agreement, 22 February 2012);
- the Risk Assessment Document did not report the safety measures to be adopted for the risk of overturns, in particular the procedures to be implemented based on the conformation of the terrain.

What factors led to the serious consequences for the worker's health?

The lack of a retention system and the protection structure around the driver's seat meant that the driver was thrown out and remained trapped under the tractor.

What should the agricultural employer/entrepreneur have done?

- Equip the tractor with a driver retention system and a driving position protection structure;
- define the safety measures for the risk of overturns in the Risk Assessment Document, giving particular attention to the procedures to be implemented based on the conformation of the terrain;
- guarantee the vehicle is driven only by drivers to drive tractors and ensure they are given suitable training for their use.

What should the adequately educated and trained agricultural worker driving the vehicle have done?

- followed the safety procedures indicated in the risk assessment.
- pay attention to the maneuvers to be carried out, in relation to the danger given by the conformation and type of terrain where they are.

What are the possible consequences?

Crushing with serious injuries and/or death.

The event could have been avoided or in any case with less serious consequences if the tractor had been equipped with suitable safety systems and the operator appropriately trained in Risk Assessment.

Case 2

Context
The owner of a farm was fertilizing steeply sloping land using a wheeled tractor with a manure spreader.

How the injury occurred
While carrying out the operation, due to the steep slope of the terrain, the tractor picked up speed and the driver was no longer able to control and maneuver the vehicle which reached the end of the slope and hit the ground. The driver was thrown out of the cockpit and then crushed by the tractor which overturned.

What factors led to the accident?
The accident was caused by the following factors:

- the use of an unsuitable vehicle: given the steep slope of the land, a tracked tractor should have been used which guarantees greater grip on the ground;
- the incorrect execution of the operation: given the steep slope, the trajectory of the vehicle should have been less perpendicular;
- failure to use the engine brake when going downhill in a suitable gear.

Quali fattori hanno determinato le gravi conseguenze per la salute del lavoratore?
La mancata trattenuta alla seduta mediante cintura di sicurezza ha determinato che l'operatore, in caso di impatto e rovesciamento, venisse sbalzato fuori dall'abitacolo e quindi schiacciato.

What factors led to the serious consequences for the worker's health?
Failure to secure the seat using a seat belt resulted in the operator being thrown out of the cockpit and therefore crushed in the event of an impact or overturning.

What should the farmer driving the vehicle have done?

- Use a tracked and non-wheeled tractor;
- use the engine brake by engaging the gear you would use uphill before tackling the slope to prevent the tractor from picking up speed and not being able to manage with the mechanical brake alone;
- identify a more suitable route, carrying out maneuvers less perpendicular to the descent;
- fasten the seat belt, which would have kept him inside the ROPS casing, guaranteeing the safety volume in correspondence with the driving position. The use of a seat belt would probably have prevented the death of the farmer himself.

What are the possible consequences?
Crushing with serious injuries and/or death.
The probability of occurrence is high in the presence of steep slopes.

Case 3

Context
An agricultural worker, after completing hay raking with the aid of a tractor to which the rake was connected, the tractor was moved to a slightly sloped area to remove the rake. The tractor was parked and left with the engine running. The handbrake was not engaged.

How the injury occurred
The tractor, due to the slope, began to move and the farmer, trying to stop it, started running, but fell and was caught by the rake which dragged him for 15 meters to a nearby embankment. The tractor overturned and the worker was crushed by it.

What factors led to the accident?
The accident was caused by the following factors:

- positioning the tractor without using the braking system;
- positioning the tractor on sloping terrain, even if slight;
- failure to use a chock under a tire.

What factors led to the serious consequences for the worker's health?
The serious consequences were caused by the worker's attempt to stop the moving tractor.

What should the worker driving the vehicle have done?
Before starting to disconnect the towed implement, the driver should have:

- choosen a terrain to park the vehicle without a slope;
- stop the tractor and engage the handbrake;
- turn off the tractor engine;
- place a chock under a tire.

What are the possible consequences?
Crushing with serious injuries and/or death.

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