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MAD

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POLITICS

The new Sabatini » 9

Events

Life in the field



» 11

VÄDERSTAD

Carrier L 525



» 29

VALTRA

The new A Series



» 43

OLDTIMERS

Fiat 702



» 59

In the field with
In campo con

SIP Silvercut Disc

» page no. 22



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SIP Silvercut 800 C RC and 300 F RC

by Romano Demaldè

We've written a report on the first and second mowing performed with the disc mower with rubber rollers produced by the Slovene producer SIP. The mower features a working width of 8 m and requires a tractor power of at least 160 HP.

An ever-greater number of producers offer triple mower combinations, consisting of one front unit and two side rear units, mounted on a tractor with at least 150–180 HP. These mowers provide for a working width of 8–10 metres in a single pass. The cutting bar comes almost exclusively with discs, while the conditioner is available with rollers or fingers.

Triple mower combinations that are intended for large livestock and agricultural companies, and forage suppliers, are characterised by a working speed of at least 7–10 kilometres per hour, providing high efficiency and enabling us to mow 10 hectares per hour.

One of the companies to consider when purchasing a triple mower combination is the Slovene company SIP, Strojna Industrija d.d.

from Šempeter v Savinjski dolini. For 60 years, the company has been producing mowing and hay harvesting machines (disc rotary mowers, rotary mowers, mower conditioners with fingers or rollers, tedders, and corn harvesters (see article published in issue no. 5/2017 of the MadMacchine agricole domani). SIP exports more than 80% of its products to 55 countries around the world, with Switzerland, Austria, and Germany being among its key markets. The Slovene producer also operates in the Italian market with a sales network composed of a dozen or so agents operating in northern Italy and generating a revenue of €800,000.

We performed two tests of the Silvercut triple disc mower with rollers

The two **units** (the front unit 300 and the rear unit 800) feature **the same mechanical characteristics with regard to the cutter bar**, both in terms of the number of its elements (7 discs and 14 blades) and working width (2.97 m).



composed of two rear side units 800 C RC and one front unit 300 F RC. The first test included lucerne mowing at a farm from Bondeno near Ferrara, while the second took place in Volta Mantovana near Mantova where a permanent pasture was mowed.

Common characteristics of the two units

Both units (front and rear) are powered by a power take-off of 1,000 rpm and have cutting bars with 7 oval discs with paired rotation and a disc rotation speed of 3,000 rpm. The discs are offset at a 90° angle. Each disc is composed of two hinged opposed blades, made by the German manufacturer Radura with the following dimensions: 110x48x4 mm (length x width x thickness). The Quick Change System intended for changing blades is an interesting feature.

Since the blades are not fixed with classic bolts and nuts, they can be removed by applying pressure upwards onto the lower surface of the disc using a special supplied wrench found in the machine frame. The blades have cutting edges on both sides which allows for them to be inverted when one edge wears out. Both blades of a disc must be changed simultaneously

to prevent possible imbalances during rotation. You can use the same wrench to regulate the flaps which determine the width of the swath. Another interesting feature of SIP's products is the Disc Drive Safety System (DDSS). There are four brass cotters placed between the drive gear and the disc which deform in the event of excessive overload. This interrupts the motion to prevent damage to the drive gear. There are wear protection pads made of Hardox steel placed under the bar (one per disc). The pads ensure long-lasting durability and protect the bar and the discs. Side discs are equipped with a swath cylinder for forage with conditioner rollers. SIP offers the possibility to choose a roller conditioner suitable for lucerne, clover, and leguminous vegetables in general, or a finger conditioner suitable for single-plant grass pastures and permanent pastures. The tested machine was equipped with a rubber conditioner composed of a pair of synchronised ribbed rollers made of polyurethane,

with a fixed ratio rotation of 1,000 rpm. The motion is transmitted through a belt to the inferior roller which in turn generates the upper roller. The default value of the crush pressure is set to medium and can be adjusted manually by acting on tension springs on each side of the bar. Each roller is composed of 10 segments that can be replaced individually in the event of damage.

The 800 C RC disc

The two 800 C RC rear units, weighing a total of 2,320 kg are hinged onto a metal frame unit which can be mounted on the tractor by a cat. III three-point hitch. The movement of the two units is achieved by a double-acting distributor (the open/close operator and the lift/lower function for manoeuvres carried out at the end of the field) and a single-acting distributor to enable pressure in the hydraulic system intended for floating. If the pressure value is set at 150 bar, the pressure to the ground under the bar is around 200 kg. The cutting height (between 40 and 70 mm) depends on the incidence angle of the discs on the terrain. Its default value is set to 3° to exploit the different lengths of the 4 stands (these values apply if the machine is parked on a flat surface) and it can be modified by increasing or reducing the preset angle of 3°.

The 300 F RC disc

The construction of the front mower conditioners is more complex than that of the rear units. The 300 F RC model weighs 940 kg and has a working width of 2.97 m.

Series

TRIPLE SIP SILVERCUT DISC COMBINATION

	REAR UNIT		FRONT UNIT	
	800 C RC	900 C FC	300 F RC (*)	300 F FC (*)
Working width (m)	8.00	8.69	2.90	2.90
Transport width (m)	2.86	2.86	2.96	2.96
Discs (no.)	14	16	7	7
Blades (no.)	28	32	14	14
Conditioner type	rollers	fingers	rollers	fingers
Min. tractor power req. (HP)	160	190	80	80
Total weight (kg)	2,320	2,320	940	810
Price (VAT excluded) (euro)	34,490	34,490	17,450	16,050

(*) S-Flow version (parallelogram-shaped frame).

The price of the tested machine (Silver cut 800 C RC + 300 F RC): €51,940 euro.



Two robust hydraulic jacks (one per unit) enable a horizontal working position with a **maximum working width of 8 m** (front unit included) and a 120° upward fold which can be used for road transfers (in this case the dimensions are **reduced to 2.86 m**). The conditioner rollers are 2.34 m long, which makes for 81% of the working width (2.90 m).

At SIP they have adopted a solution called S-Flow featuring hydropneumatic suspension. The S-Flow ensures a constant perfect guide to the terrain. The vertical travel of the cutter bar is from 30 to -20cm, while the angle of transversal adjustment to the terrain is $\pm 28^\circ$. The end of the front piston stem features a slot to prevent the distributor from being used in the floating phase.

Our impression

We tested the triple combination from SIP on two different occasions: the first included mowing of an abundant harvest of lucerne (lot A) and the second took place on a permanent pasture covered almost exclusively by ryegrass (lot B).

Lot A. The mowing of lucerne took place on a 21 hectare lot near Ferrara in the second ten days of May, due to adverse weather conditions. With continuous rains during the days prior to the mowing, the resulting crop was quite humid.



1. The **safety device** enables the entire cutting unit to move back and come up in the event of accidentally hitting an obstacle.
2. The two cutting bars are activated by **Walterscheid's P.T.O. shafts** which in turn receive power from the tractor's power take-off of 1,000 rpm.
3. The **hydraulic piston** used to regulate the pressure to the ground.

Comparison with competitors

COMPARE
the full characteristics
of single models at
macchineagricoledomani.it
the website for
farming technology



SILVERCUT



DISCO



ARROW



SLICER



FC



EASYCUT



REAR UNIT	800 C RC	CONTOUR 8500 RC	DELTA 9000 R	911 TL RC	813 R	B 870 CR
Cutting bar						
Working width (m)	8	8.10	9.00	8.30	8.10	8.70
Total number of discs	14	14	16	12	14	14
Total number of blades	28	28	32	24	28	28
Disc rotation speed (rpm)	3,000	3,200	3,100	-	2,986	3,300
Width of swath (m)	1.40–2.80	1.20–2.20	1.30–2.10	1.45–1.90	1.20–2.50	1.40–2.80
Conditioner						
Type	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers
Rotation (rpm)	1,000	940	920-1,100	-	1,000	1,000
Weight and dimensions						
Transportation: width/height (m)	2.86/3.50	2.95/3.64	3.00/3.7	2.78/3.73	3.00/4.00	2.78/3.80
Weight (kg)	2,320	2,100	2,750	2,508	2,835	2,730
Power request (HP/kW)	160/119 kW	160/118	205/150	175/128	170/125	150/110
Price	34,490	53,079	47,200	44,840	50,659	55,755
FRONT UNIT	300 F RC S-FLOW	3200 FRC	3200 FRONT R	310 FZ RC	313 RF	F 320 CR
Cutting bar						
Working width (m)	2.90	3.00	3.20	3.00	3.11	3.16
Total number of discs	7	7	8	6	8	7
Total number of blades	14	14	16	12	16	14
Disc rotation speed (rpm)	3,000	3,200	3,100	-	2,986	3,300
Width of swath (m)	1.40–2.40	1.30–2.00	1.30–2.50	1.55–1.90	1.50–1.60	1.40–2.40
Conditioner						
Type	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers	Rubber rollers
Rotation (rpm)	1,000	950	920-1,100	-	1,000	1,000
Weight and dimensions						
Transportation width (m)	2.96	3.00	3.00	3.00	2.99	3.00
Width (kg)	940	1,040	1,150	1,202	1,356	1,300
Power request (HP/kW)	80/60	70/51.4	90/66	87/64	66/49	80/59
Price	17,450	20,405	27,390	21,290	22,401	25,480
TOTAL PRICE						
Price (VAT excluded) (euro)	51,940	73,484	74,590	66,130	73,060	81,235

Information and data from the table were provided by the respective manufacturers and refer to the basic models.

The lodged crop with a significant presence of dry grass made up for a particularly abundant harvest with an average moisture content of 72%. The mowing was performed at an average speed of 8 km/h.

Lot B. The second mowing test was performed on a permanent pasture near Mantova. Much as at the first lot, the crop here was rather lodged too. We were mowing at a speed of 7–8

km/h. In order to maximise performance, we reached a maximum speed of 12–13 km/h (exceeding this speed would cause the engine speed to fall).

Regardless of the challenging working conditions, the triple combinations did well on both lots.

Cutting height. The cutting height of all three units was set to 50 mm at lot A and to 70 mm at lot B. In both cases the actual cutting height corresponded to these values provided that the crops were mowed in the opposite direction to

their lodging. If mowing was performed in the direction of lodging, the cutting height was higher (100–120 mm).

Cutting quality. The precision of the cutting bar depends essentially on the adequate disc rotation speed, the forage density, the degree of lodging, the evenness of the terrain and, above all, on the mowing speed. The cut achieved during the tests was clean and precise if the crops were mowed in the



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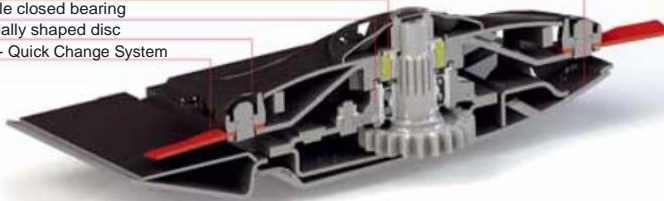


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4. Both cutting bars are composed of **7 oval discs** with a paired opposite rotation and a disc rotation speed of **3,000 rpm**. Each disc has **wear protection pads made of Hardox steel** which can be removed by unscrewing the bolt holding it.
5. Each bar is equipped with **14 Radura blades** (2 per disc) featuring a quick-release system with a special supplied wrench found in the machine frame.
6. The low-profile **discs** with a thickness of 5 mm are **powered by cascade gears** submerged in an oil bath.

Skids in cold-pressed Hardox steel
 DDSS - Disc Drive Safety System
 Double closed bearing
 Specially shaped disc
 QCS - Quick Change System



6

Testing conditions

	Lot A	Lot B
Length x width (m)	450 x 470	400 x 260
Surface (ha)	21	10.4
Type	Lucerne, 4 years	Permanent pasture
Variety	Prosementi	Ryegrass
Mowing	First	Second
Crop condition	Lodged and very tangled	Very lodged
Average height of plants (cm)	110	100
Infesting species (%)	Fleum P. (22), Festuca A. (15), Agrostis A. (8)	Virtually absent
Terrain conditions	Levelled and quite humid	Levelled and dry
Swath:		
Medium width (cm)	Front: 140, side: 130	Front: 140, side: 130
Height (cm)	35	30
Average mass (kg/m)	5.6	5.9
Set cutting height (mm)	50	70
Contamination with soil (%)	Front: 2, side 4.5	Front: 0.5, side: 2.5
Average mowing speed (km/h)	8.4	7.5
Actual work capacity (hectares/hour)	5.3	4.8
Production per hectare (t)	21.3	23.4
Hourly productivity (t/hour)	112.90	112.30
Tractor used:	J.D. 6920 with AutoQuad	Same Fortis with a 24/24 P.S.
Brand and model	transmission, 158HP (116	transmission, 184HP (135
Nominal power (HP/kW)	kW), and a weight of 5,400	kW), and a weight of
	kg	6,360 kg



A



B

The lots where the tests took place:

- A. First mowing of lucerne
- B. Second mowing of a permanent pasture. Regardless of an abundant quantity of plant mass passing through the rollers, the swaths were even and characterised by a constant density, which is important for the subsequent spreading and tedding.



7



8

7. The front unit is lean and features a parallelogram-shaped frame without the usual housing, enabling this way better visibility to the machine operator.

8. The front cutting bar is guided by a parallelogram-shaped frame (the S-Flow System) which at the same time provides support to the front part of the bar. This enables the bar to travel both upwards and backwards to adapt to obstacles and uneven terrain.

9. The suspension system features two pistons:

the first is used to regulate the pressure of the floating on the surface, while the second features a slot which automatically regulates the longitudinal inclination of the unit.

10. The unit can be attached to the tractor using a cat. II lift with arms and a double-acting hydraulic distributor.

11. For transportation purposes, the side units may be lifted which reduces the surface occupied by the units to 2.20 m



9



10



Impressions

LIKES



- ▶ An elevated hourly productivity despite an abundant plant mass
- ▶ Great cutting precision
- ▶ The requested tractor power

D

DISLIKES



- ▶ The forage is launched very high (at the front RC) therefore the grille of the tractor bonnet must be cleaned frequently.

K

opposite direction to their lodging, and higher and shredded if mowing was performed in the direction of lodging.

Conditioning. In view of an abundant forage, both in the case of the first and second mowing, the conditioning efficiency was considerably reduced (1 to 2 crushes along the stems, mostly at the bottom part) due to an increased distance between the rollers, which is necessary for discharging the forage. The pressure of the rollers, which was set to medium by the manufacturer, sufficed to crush long lucerne stems (around 110 mm) which were still green and partially flowering at intervals of around 15 cm from the bottom part.

Contamination. Due to an appropriate cutting height which was not too low, and the floating of the units the contamination of

forage with soil was very limited. The latter is especially true for the front unit, while with the two rear units the contamination was slightly higher. The grass substrata was virtually untouched.

Productivity. Although the mowing speed (8.4 km/h) was not high due to an abundant quantity of crop, the work capacity after considering the up and downtime was 5 hectares per hour.

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