

STUDIES ABOUT THE USE OF TECHNICAL METHODS IN ORDER TO IMPROVE THE WORKING PROCESS OF PLOW BODY

PUFULETE CRISTIAN¹, ION SĂRĂCIN¹

¹University of Craiova

Tel. 0769 251 311

E-mail cristianpufulete@yahoo.com

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Abstract

In this paperwork the authors present the technical improvements nationally and internationally on the construction of the plow bodies which are equipping the general use ploughs for the work execution of the plowing work. The study started from the main operating parameters of the general use plow bodies, respectively the degree of overturning and crushing of the furrow as well as the degree of the ground leveling. Therewith it is referring to the resistance of the haulage and to the reduction of the fuel consumption regarding the elimination of the harrowing work with the execution of the plowing work. Plow bodies made by several both national and international manufactures were taken into this study.

INTRODUCTION

The plowing work is considered the main work of the ground, being the most widespread worldwide. The purpose of this work is to create the optimal conditions for the good development of the crops through the burying and mixing of the vegetable waste, but also through soil aeration. During the plowing the working surface of the plow body subdues the soil to a complex process of mechanical detachment, that consists of a series of phenomena that arise gradually in the soil layer as the plow body goes forward. The mechanical detachment of the soil under the action of the feather is made in 4 successive phases: in the first phase, the soil compresses plastically with the air from the capillary spaces; in the second phase, the soil and the capillary air continue to compress, accumulating a potential energy; in the third phase, the breaking limit caused by the soil

resistance is reached. In this moment, the soil is coming off, and the pressure of the feather above it is stopping; the fourth phase consists of the compressed air rebound into the capillary spaces from the first two phases and the transformation of the potential energy into the soil destruction action, crumbling it. The final purpose of the working moldboard action is to crumble the furrow and to overthrow it, moving it sideways.

The constructive parameters of the plow bodies were so optimized, as to comply all the imposed conditions by the culture technologies (the crumbling degree, depth, uniform leveling etc.)

MATERIAL AND METHOD

The body form of the plow body is very important for the execution of a superior quality plowing, that is depending directly on the soil type. So, those from the company AMAZONE are presenting us the following plow bodies types with

the next specifications: the min./max. Depth of the work; the width of the plow body; the soil type; the crumble degree; the distance between the plow bodies;

the power necessary and the furrow overturning.

The symbol for the performance class of the work indices are in the fig. 1


Suitability:	++	very suitable
	+	good suitable
	0	Suitable
	-	unsuitable

Fig.1 Symbol for the performance class[3]

Source:Presentation catalog AMAZONE[3]

Table1

The plow body WY 400[3]

The plow body	
Min. depth (cm)	17
Max. depth (cm)	30
The max. working width of the plow body (cm)	50
Suitability	
Slope land	0
Crumble	+
The power necessary	++
Soil overturning	++


The plow body with helical corman which is suitable for medium and heavy soils with low humidity. The crumbling

degree it is a suitable one and the overturning of the furrow is done in excellent conditions.

Source:Presentation catalog AMAZONE[3]

Table2


The plow body WX 400[3]

The plow body	
Min. depth (cm)	12
Max. depth (cm)	33
The max. working width of the plow body (cm)	55
Suitability	
Slope land	-
Crumble	0
The power necessary	++
Soil overturning	+

The plow body with semi-helical corman ideal for the heavy, very heavy and loamy grounds.
Source:Presentation catalog AMAZONE[3]

Table3

The plow bodyWX 400 PE[3]


The plow body	
Min. depth (cm)	12
Max. depth (cm)	25
The max. working width of the plow body (cm)	50
Suitability	
Slope land	-
Crumble	0
The power necessary	++
Soil overturning	+

The plow body with semi-helical corman made of plastic ideal for the very adherent soils

Source:Presentation catalog AMAZONE[3]

Table4

The plow bodyWST430[3]

The plow body	
Min. depth (cm)	15
Max. depth (cm)	33 0
The max. working width of the plow body (cm)	55
Suitability	
Slope land	-
Crumble	++
The power necessary	+
Soil overturning	++

The plow body with stripcorman, is mixing a low power necessary with the excellent results in the adherent soils.

Source:Presentation catalog AMAZONE[3]

In order to raise the plow body performance, is added to the furrow cutting disk (fig. 2 and 3.) , this is contributing meaningfully to an efficient plowing. The cutting disk helps to the furrow overturning and to the complete incorporation of the vegetable waste.



Fig.2 The furrow cutting disk[3]

Source:Presentation catalog
AMAZONE[3]



Fig.3The furrow cutting disk[3]

Source:Presentation catalog
AMAZONE[3]

Another added item is the ante plow body fig. 4, 5, 6 [3], this ensure a furrow without blockage.



Fig.4 The ante plow bodyM0[3]

Source:Presentation catalog
AMAZONE[3]

This ante plow body is used there, where there are large quantities of culture residues.



Fig. 5The ante plow bodyG1[3]

Source:Presentation catalog
AMAZONE[3]

It ensure a furrow without blockage.



Fig.6 The ante plow bodyM3[3]

Source:Presentation catalog
AMAZONE[3]

Its performance is best when the vegetable residues are extreme. The manufactures from MASCHIO GASPARDO are saying that the secret

the furrow is in the corman.



Fig. 7 MP4WS[4]

Source: Presentation catalog MaschioGaspardo[4].
Plow body with helical corman.
Working depth 15-30 cm.
Working width 30-55 cm.
For the winter furrow and wet soils.



Fig. 8 MP4WN[4]

Source: Presentation catalog MaschioGaspardo[4].
Plow body with semi-helical corman.
Working depth 20-38 cm.
Working width 30-55 cm.



Fig. 9 MP4N[4]

Source: Presentation catalog MaschioGaspardo[4].
Plow body with strip semi-helical corman.
Working depth 20-30 cm.
Working width 30-55 cm.
Best for medium and clay soils.



Fig. 10 MP4QB[4]

Source: Presentation catalog MaschioGaspardo[4].
Plow body with tubular corman.
Working depth up to 40 cm.
Working width 30-55 cm.
Best for all soil types.



Fig. 11 MP4WD

Source: Presentation catalog MaschioGaspardo[4].
Plow body with semi-helical corman.
Working depth 15-30 cm.
Working width 35-50 cm.
Best for all soil types.
The french people from KUHN went for the next plow bodies choice:



Fig. 12 TrupitaN[5]

Source: Presentation catalog Kuhn[5].
Tubular helical semi-digger. Working depth is 15-30 cm. Tubular on the front helical in the back. Narrow conception ensures a partially shattered furrow but also an excellent incorporation of the vegetable residues.



Fig. 13 TrupitaH4[5]

Source: Presentation catalog Kuhn[5]
The capacity of this helical long plow body, Scandinavian, ensures well formed furrows up to a width of 30 cm. It is best for heavy and wet argil.



Fig.14 Trupita in fasii VP

Source: Presentation catalog Kuhn[5]
It is a plow body made from independent and interchangeable strips. It ensure a reduction of traction force, due to a smaller coramn area. Like those from AMAZONE, the manufactures from KUHN give us the posibility to improve the working process of the plough throuh the plow body upgrade with a deflector or with the assemblment of the ante plow body.



Fig. 15 The deflector[5]

Source: Presentation catalog Kuhn[5]
The deflector helps with the incorporation of the vegetable residues in hard conditions where the big residues capacity would lead to the plugging of the ante plow body.

METHOD

Studies in the literature, catalogs and tehcnical notes of agricultural machinery manufacturers, web-bibliography

CONCLUSIONS AND COMMENTS

The plow bodies with cormans, being also the most udes plow bodies from the farmers, had a spectacular evolution worldwide. The plow bodies were improved in order to grow the furrow quality, being capable to offer a big adaptability degree.

The helical corman: overturns the furrow, but the crumbling degree is small.

The Tubular corman: overturns good the furrow and therewith crumbles satisfying the ground.

The semi-helical corman: is the most popular from all the corman types, because it combines the two advantages: overturns and crumbles very good the soil.

The lamellar corman reduces the traction and has a high efficiency on all soil types regarding the furrow overturn, the vegetable reisdues covering and the soil crumble degree.

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