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PRELIMINARY RESEARCH ON THE INFLUENCE OF CERTAIN AGROTECHNICAL MEASURES ON THE GROWTH OF THE ‘ANNA SPÄTH’ PLUM VARIETY UNDER THE CONDITIONS OF THE MOARA DOMNEASCĂ EXPERIMENTAL STATION, ILFOV COUNTY

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Abstract

The study (2022-2023) at Moara Domnească Experimental Base, affiliated with the Research and Development Station for Pomology Băneasa, Ilfov County, evaluated the effects of land shaping, localized irrigation, and two rootstocks on the growth of the ‘Anna Späth’ plum cultivar using a split-plot experimental design. Planting on ridged terrain did not significantly enhance growth parameters. In 2023, the trunk cross-sectional area was 1.23 cm² smaller per tree in ridged terrain than in flat terrain. Localized irrigation significantly improved growth. The trunk cross-sectional area increased by 0.86 cm² in the first year, 1.77 cm² in the second year, and 1.31 cm² on average. The number of shoots per tree rose by 2.77 (2022), 3.07 (2023), and 2.92 on average. Total shoot length increased by 183.5 cm (2022), 358.6 cm (2023), and 271.0 cm on average. The mean shoot length grew by 12.62 cm (2023) and 10.05 cm on average. No significant differences were observed between the two rootstocks. These results emphasize the benefits of localized irrigation in improving plum tree growth, while land shaping and rootstock selection had no notable impact.

Key words*: Prunus, land shaping, rootstock, irrigation, research.*

INTRODUCTION

The plum tree (*Prunus domestica*) represents the most extensively cultivated fruit species in Romania, owing to its high adaptability to diverse vegetation conditions and the multiple possibilities for fruit utilization. In intensive orchard systems, land preparation techniques play a crucial role in optimizing growth conditions and enhancing productivity. Studies have demonstrated that deep soil preparation prior to planting can provide substantial benefits during the initial fruit-bearing years. For instance, plowing to a depth of 55 cm has been shown to increase fruit yield by up to 322% in the second year compared to shallow plowing at 22 cm (Iancu, 2008).

In Romania, climatic conditions can significantly impact plum orchards, particularly in years characterized by insufficient or unevenly distributed precipitation. Under such circumstances, irrigation becomes a critical factor in ensuring optimal tree growth. Drip irrigation, widely employed in modern fruit-growing systems, has proven to be highly efficient in maintaining optimal soil moisture levels by enabling uniform water distribution and minimizing losses due to evaporation (Oltenacu et al., 2015). Research has indicated that this irrigation method significantly enhances tree growth parameters and is particularly beneficial for species sensitive to fluctuations in soil moisture (Septar & Stoli, 2019).

Furthermore, the rootstock onto which trees are grafted plays a pivotal role in influencing their ability to absorb water and nutrients from the soil. By selecting rootstocks adapted to local soil conditions, the water and nutrient uptake efficiency of moisture-sensitive cultivars, such as ‘Anna Späth’, can be significantly improved (Sumedrea et al., 2014).

To contribute to the optimization of growth and yield processes for the ‘Anna Späth’ plum cultivar under the specific conditions of the

Moara Domnească Experimental Base, Ilfov County, research was initiated in 2022. This study aims to assess the effects of various agrotechnical measures on tree development, with a particular focus on land preparation methods, irrigation strategies, and the selection of suitable rootstocks.

MATERIALS AND METHODS

The research was conducted on flat terrain, with a general slope of approximately 0.5-1%, on soil identified as reddish preluvosol, consisting of medium clay-loam.

Figure 1 shows the average annual precipitation recorded over a 33-year period at the meteorological station of the Institute of Meteorology in Bucharest, located approximately 1.5 km from the research site. The average was 589.08 mm, with annual values ranging from 327.2 mm in 2022 to 1053.7 mm in 2013.

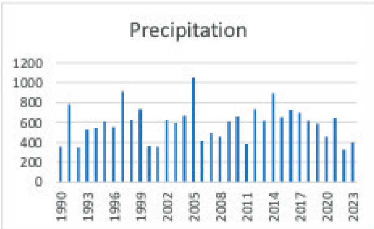

Figure 1. Annual Precipitation (mm)

To achieve the aforementioned objectives, the following factors were taken into consideration:

Factor A - Land Shaping, with the following treatments:
- a1 - Land Shaping in Ridges;
- a2 - Flat Land;

Factor B - Drip Irrigation Application, with the following treatments:
- b1 - Irrigated;
- b2 - Non-irrigated;

Factor C - Rootstock, with the following treatments:
- c1 - 'Mirobolan C5';
- c2 - 'Adaptabil'.

Thus, a 2×2×2 three-factorial experiment was established, with four replications and two trees measured for growth in each replication. The selected trees were isolated from neighboring ones to avoid competitive influences. Trunk thickness growth was measured by determining the diameter above the grafting point, and cross-sectional areas were calculated based on the measurements. Additional vegetative parameters such as number of shoots, total shoot length, and average shoot length were recorded annually after leaf fall in 2022 and 2023.

The plum rootstock selection in Romania includes native varieties adapted to local conditions, which provide advantages in terms of efficient water and nutrient supply, contributing to optimal plum growth. Among these, the 'Mirobolan' type rootstocks are the most widely used, representing approximately 85-90% of the total used in Romania. Recently certified rootstocks, such as 'Adaptabil' and 'Mirodad 1', have been developed to better address the climatic and soil challenges of specific regions (Botu et al., 2010).

The two rootstocks selected for this study exhibit different root system characteristics. 'Mirobolan C5' typically reaches rooting depths of 1-1.2 meters, while 'Adaptabil' has a shallower and more horizontally spread root system, with active absorption concentrated in the upper 60 cm of soil - an area particularly rich in nutrients and moisture. The choice of rootstock plays an essential role in determining tree vigor, the onset of fruiting, and also the quality of production - factors demonstrated in multiple studies on various Romanian and international plum cultivars (Zamfirescu et al., 2019; 2020; Iliescu et al., 2023).

In the variable climatic conditions of Romania, where precipitation is often insufficient or unevenly distributed, drip irrigation has become an essential practice in modern fruit growing. Its capacity to maintain consistent soil moisture, reduce evaporation losses, and improve water use efficiency has been demonstrated in multiple studies. For instance, Oltenacu et al. (2015) highlighted its role in enhancing vegetative growth and fruit quality, while Oltenacu N. and Oltenacu C.V. (2014) reported significant increases in plum production in the 'Anna Späth' variety under drip irrigation.

Figure 2 shows the application of irrigation between May 3 and September 28, 2022, with a total of 32 irrigation events, each providing 8 liters of water, resulting in a total input of 256 mm of water.

2022	Interval de 4 ore la fiecare irigare																															
LUNA/ZIUA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL
APRILIE																																0
MAI			8			8				8			8				8							8			8					56
IUNIE																					8			8				8				24
IULIE	8				8			8				8			8				8			8				8			8			72
AUGUST		8			8				8			8											8			8				8		56
SEPTEMBRIE						8			8				8			8				8			8									48
OCTOMBRIE																																0
																															TOTAL	256

Figure 2. Drip Irrigation Application in 2022

Figure 3 shows the application of irrigation between April 28 and October 30, 2023, with a total of 35 irrigation events, each applying 10 liters of water, resulting in a total input of 348 mm of water.

2023	Interval de 5 ore la fiecare irigare																															
LUNA/ZIUA	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	TOTAL
APRILIE																												8				0
MAI		10										10				10			10							10				10		60
IUNIE		10				10			10				10			10							10									60
IULIE											10							10							10			10				40
AUGUST				10				10			10				10			10				10			10				10			80
SEPTEMBRIE	10				10			10				10			10				10			10				10			10			90
OCTOMBRIE			10																													10
																															TOTAL	340

Figure 3. Drip Irrigation Application in 2023

Land shaping in ridges involved three successive plowing operations (November 2021, April 2022, and March 2023) that gradually formed ridges approximately 1.8 meters wide and 0.4 meters high. This system supports surface drainage, especially during periods of excessive precipitation, preventing water accumulation around the tree roots. Additionally, the ridging process displaced topsoil, considered to have superior physical, chemical, and biological conditions for root development.

This technique is supported by previous findings: Iancu et al. (1984) observed improved trunk growth in 'Agen 707' plum trees planted on ridged terrain compared to flat terrain on pseudogleized brown luvic soil in Zmeura, Argeș County. Similarly, Canarache (1986) highlighted the role of terrain modeling in facilitating surface drainage and improving plant health. Recent studies by Da Silva et al. (2024) further support the importance of soil hydraulic properties such as water retention θ(h) and hydraulic conductivity K(h) for effective irrigation planning. Ridge formation improves root aeration, minimizes waterlogging risks, and reduces the incidence of diseases linked to excess soil moisture.

RESULTS AND DISCUSSIONS

Table 1 presents, for each of the two research years as well as their average, the differences in values between the levels of experimental factors regarding trunk thickness growth (mean/cm²). The data indicate that in the first year of research (2022), the cross-sectional area of the trunk measured in the ridge-shaped terrain variant (a1) was significantly larger by 0.70 cm²/tree compared to the flat terrain variant (a2), but only under irrigated conditions and for the 'Mirobolan C5' rootstock (b1c1).

In the same year, irrigation with 256 mm of water compared to the non-irrigated variant led to a highly significant increase of 0.86 cm²/tree across the entire experiment. The irrigation effect was significantly greater by 1.22 cm²/tree in the ridge-shaped terrain variant with the 'Mirobolan C5' rootstock and by 0.92 cm²/tree in the ridge-shaped terrain variant with the 'Adaptabil' rootstock.

In the second experimental year (2023), the data presented in Table 1 show that in the ridge-shaped terrain variant (a1), compared to the flat terrain variant (a2), trunk thickness growth was distinctly significantly lower by 1.23 cm²/tree. The differences between the two terrain modeling variants (a1 and a2) were significantly larger by 1.41 cm²/tree in the irrigated variant with the 'Mirobolan C5' rootstock and by 1.33 cm²/tree in the non-irrigated variant with the 'Adaptabil' rootstock.

On average over the two years, terrain modeling in ridges compared to flat terrain did not significantly influence trunk thickness growth for any of the experimental factors or their levels. However, irrigation (b1) compared to the non-irrigated variant (b2) resulted in a highly significant increase in trunk thickness of 1.31 cm²/tree. The differences were more pronounced, being distinctly significant at 1.47 cm²/tree for the 'Adaptabil' rootstock, and only significant at 1.21 cm²/tree for the 'Mirobolan C5' rootstock.

The data in Table 2 show that during the first experimental year (2022), the application of 256 mm of irrigation water, compared to the non-irrigated variant, led to an increase of 2.77 shoots per tree, with the difference being distinctly significant. The difference between the irrigated (b1) and non-irrigated (b2) variants regarding the number of shoots per tree was greater by 3.08 shoots per tree only in the variant where the land was shaped into ridges and for the ‘Adaptabil’ rootstock, with the differences being distinctly significant.

Table 1. The Influence of Experimental Factors and Their Levels on the Growth in Cross-Sectional Area of the Trunk of 'Anna Späth' Plum Trees in the First Two Years After Planting (2022-2023)

D	2022			2023			Avarage 2022-2023		
	E	LSD	F	E	LSD	F	E	LSD	F
a1-a2	0,27	0,208	n.s.	-1,23	0,002	**	-0,48	0,064	n.s.
b1-b2	0,86	0,000	***	1,77	0,000	***	1,31	0,000	***
c1-c2	0,04	0,843	n.s.	0,62	0,092	n.s.	0,33	0,196	n.s.
a1b1c1-a1b1c2	0,20	0,635	n.s.	0,32	0,439	n.s.	0,26	0,482	n.s.
a1b2c1-a1b2c2	-0,10	0,759	n.s.	1,15	0,137	n.s.	0,53	0,261	n.s.
a2b1c1-a2b1c2	-0,24	0,552	n.s.	0,36	0,706	n.s.	0,06	0,924	n.s.
a2b2c1-a2b2c2	0,30	0,603	n.s.	0,64	0,431	n.s.	0,47	0,440	n.s.
a1c1b1-a1c1b2	1,22	0,017	*	1,19	0,130	n.s.	1,21	0,041	*
a1c2b1-a1c2b2	0,92	0,036	*	2,02	0,002	**	1,47	0,003	**
a2c1b1-a2c1b2	0,38	0,405	n.s.	1,78	0,044	*	1,08	0,065	n.s.
a2c2b1-a2c2b2	0,91	0,124	n.s.	2,07	0,071	n.s.	1,49	0,068	n.s.
b1c1a1-b1c1a2	0,70	0,49	*	-1,41	0,015	*	-0,35	0,333	n.s.
b1c2a1-b1c2a2	0,26	0,601	n.s.	-1,37	0,172	n.s.	-0,56	0,395	n.s.
b2c1a1-b2c1a2	-0,14	0,783	n.s.	-0,82	0,391	n.s.	-0,48	0,439	n.s.
b2c2a1-b2c2a2	0,26	0,537	n.s.	-1,33	0,035	*	-0,54	0,239	n.s.

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F - Analytical Significance of the Presented Values
n.s - Not significant; * - Significant; ** - Distinctly significant; *** - Highly significan

For analysing the variance like in tabel above *, **, *** is need to add the LSA 5%, LSD1%, LSD0.1%

Table 2. The influence of experimental factors and their levels on the increase in the number of shoots per tree for the ‘Anna Späth’ cultivar during the first two years after planting (2022-2023)

D	2022			2023			Average 2022-2023		
	E	LSD	F	E	LSD	F	E	LSD	F
a1-a2	-0,52	0,558	n.s.	0,12	0,861	n.s.	-0,18	0,776	n.s.
b1-b2	2,77	0,004	**	3,07	0,000	***	2,92	0,000	***
c1-c2	-0,64	0,468	n.s.	1,00	0,151	n.s.	0,17	0,791	n.s.
a1b1c1-a1b1c2	-2,45	0,092	n.s.	2,44	0,127	n.s.	0,00	1,00	n.s.
a1b2c1-a1b2c2	-1,30	0,157	n.s.	0,00	1,00	n.s.	-0,66	0,455	n.s.
a2b1c1-a2b1c2	-0,88	0,716	n.s.	1,25	0,386	n.s.	0,19	0,892	n.s.
a2b2c1-a2b2c2	2,05	0,381	n.s.	0,31	0,828	n.s.	1,19	0,502	n.s.
a1c1b1-a1c1b2	1,93	0,199	n.s.	3,19	0,070	n.s.	2,56	0,073	n.s.
a1c2b1-a1c2b2	3,08	0,002	**	0,75	0,548	n.s.	1,91	0,020	*
a2c1b1-a2c1b2	1,58	0,473	n.s.	4,63	0,015	*	3,09	0,049	*
a2c2b1-a2c2b2	4,50	0,112	n.s.	3,69	0,034	*	4,09	0,054	n.s.
b1c1a1-b1c1a2	-1,58	0,511	n.s.	-0,38	0,813	n.s.	-0,97	0,526	n.s.
b1c2a1-b1c2a2	0,00	1,00	n.s.	-1,56	0,235	n.s.	-0,78	0,408	n.s.
b2c1a1-b2c1a2	-1,93	0,096	n.s.	1,06	0,442	n.s.	-0,43	0,661	n.s.
b2c2a1-b2c2a2	1,43	0,522	n.s.	1,38	0,347	n.s.	1,40	0,412	n.s.

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During the second experimental year (2023), the application of 348 mm of irrigation water compared to the non-irrigated variant resulted in an increase of 3.07 shoots per tree, with the difference being highly significant. This differentiation occurred only in the flat land variant, with the increase being significantly higher by 4.63 shoots per tree for the ‘Mirobolan C5’ rootstock and 3.69 shoots per tree for the ‘Adaptabil’ rootstock, with the difference also being significant.

On average over the two years (2022–2023), the application of 302 mm of irrigation water per year, compared to the non-irrigated variant, led to a highly significant increase of 2.92 shoots per tree. This difference was more pronounced in the ‘Mirobolan C5’ rootstock (3.09 shoots per tree) and lower in the ‘Adaptabil’ rootstock (1.91 shoots per tree), with the differences being significant in both cases.

The data in Table 3 shows that during the first year of experimentation (2022), the application of 256 mm of water through irrigation, compared to the non-irrigated variant, increased the total length of shoots per tree by 183.53 cm, the difference being highly significant. This differentiation was greater, at 263.13 cm/tree, in the flat-maintained soil and 164.7 cm/tree in the ridged soil.

Table 3. The influence of experimental factors and their levels on the total shoot length per tree for the ‘Anna Späth’ variety during the first two years after planting (2022-2023)

D	2022			2023			Media 2022-2023		
	E	LSD	F	E	LSD	F	E	LSD	F
a1-a2	23,36	0,505	n.s.	-115,73	0,132	n.s.	-46,20	0,340	n.s.
b1-b2	183,53	0,000	***	358,56	0,000	***	271,04	0,000	***
c1-c2	8,53	0,807	n.s.	126,46	0,102	n.s.	67,50	0,168	n.s.
a1b1c1-a1b1c2	20,31	0,837	n.s.	166,20	0,174	n.s.	93,25	0,345	n.s.
a1b2c1-a1b2c2	10,13	0,716	n.s.	47,75	0,584	n.s.	28,94	0,574	n.s.
a2b1c1-a2b1c2	-64,06	0,206	n.s.	148,44	0,516	n.s.	42,20	0,736	n.s.
a2b2c1-a2b2c2	67,70	0,459	n.s.	143,45	0,386	n.s.	105,56	0,356	n.s.
a1c1b1-a1c1b2	174,88	0,053	n.s.	368,90	0,010	*	271,88	0,010	*
a1c2b1-a1c2b2	164,70	0,048	*	250,44	0,034	*	207,56	0,028	*
a2c1b1-a2c1b2	131,38	0,054	n.s.	409,94	0,034	*	270,65	0,020	*
a2c2b1-a2c2b2	263,13	0,016	*	404,94	0,112	n.s.	334,03	0,047	*
b1c1a1-b1c1a2	51,83	0,489	n.s.	-155,75	0,180	n.s.	-51,97	0,479	n.s.
b1c2a1-b1c2a2	-32,56	0,691	n.s.	-173,50	0,456	n.s.	-103,03	0,469	n.s.
b2c1a1-b2c1a2	8,32	0,891	n.s.	-114,70	0,470	n.s.	-53,20	0,579	n.s.
b2c2a1-b2c2a2	65,88	0,370	n.s.	-18,98	0,841	n.s.	23,44	0,759	n.s.

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In the second year of experimentation (2023), the application of 348 mm of water through irrigation, compared to the non-irrigated variant, resulted in an increase in the total shoot length per tree by 358.56 cm, the difference being highly significant. This differentiation was more evident, at 409.94 cm/tree, in the flat-maintained soil variant with the ‘Mirobolan C5’ rootstock. In the ridged soil variant, irrigation, compared to the non-irrigated variant, also led to a significantly greater increase of 368.9 cm/tree for the ‘Mirobolan C5’ rootstock and 250.4 cm/tree for the ‘Adaptabil’ rootstock.

The data in Table 4 show that in the first year of the experiment (2022), the average shoot length in cm was not significantly influenced by any of the experimental factors or their levels. However, in the second year, the application of 348 mm of irrigation water, compared to the non-irrigated variant, resulted in a significantly greater increase of 12.62 cm in the average shoot length. This increase was significantly higher, by 15.51 cm/shoot, in the case of the ridge-shaped land modeling and the ‘Adaptabil’ rootstock.

Table 4. Influence of Experimental Factors and Their Levels on the Growth of the Average Length of a Shoot per Tree, in the 'Anna Späth' Cultivar, During the First 2 Years After Planting (2022-2023)

D	2022			2023			Averege 2022-2023		
	E	LSD	F	E	LSD	F	E	LSD	F
a1-a2	4,34	0,364	n.s.	-8,32	0,115	n.s.	-1,99	0,705	n.s.
b1-b2	7,47	0,124	n.s.	12,62	0,015	*	10,05	0,017	*
c1-c2	4,63	0,334	n.s.	7,11	0,123	n.s.	5,87	0,124	n.s.
a1b1c1-a1b1c2	13,60	0,147	n.s.	3,01	0,576	n.s.	8,30	,134	n.s.
a1b2c1-a1b2c2	11,48	0,198	n.s.	3,78	0,565	n.s.	7,63	0,285	n.s.
a2b1c1-a2b1c2	3,36	0,560	n.s.	7,81	0,600	n.s.	5,58	0,535	n.s.
a2b2c1-a2b2c2	-9,94	0,500	n.s.	13,85	0,192	n.s.	1,95	0,845	n.s.
a1c1b1-a1c1b2	7,29	0,426	n.s.	14,74	0,106	n.s.	11,01	0,144	n.s.
a1c2b1-a1c2b2	5,17	0,518	n.s.	15,51	0,037	*	10,34	0,122	n.s.
a2c1b1-a2c1b2	15,35	0,075	n.s.	7,10	0,639	n.s.	11,22	0,168	n.s.
a2c2b1-a2c2b2	2,05	0,880	n.s.	13,14	0,282	n.s.	7,60	0,497	n.s.
b1c1a1-b1c1a2	8,22	0,224	n.s.	-8,21	0,493	n.s.	0,00	0,817	n.s.
b1c2a1-b1c2a2	-2,02	0,803	n.s.	-3,42	0,761	n.s.	-2,72	0,730	n.s.
b2c1a1-b2c1a2	16,28	0,131	n.s.	-15,86	0,186	n.s.	0,21	0,916	n.s.
b2c2a1-b2c2a2	-5,14	0,706	n.s.	-5,79	0,445	n.s.	-5,46	0,599	n.s.

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On average over the two years, ridge-shaped land modeling compared to flat land did not cause a significant change in the average shoot length per tree for any of the experimental factors or their levels. Over the same period, no significant differences were recorded between the two rootstocks. However, during this period, at the level of the entire experiment, the application of irrigation in the irrigated variant, compared to the non-irrigated one, resulted in a significantly greater increase of 10.05 cm/tree

CONCLUSIONS

The influence of the experimental factors on the vegetative growth of the trees was evaluated over two consecutive years (2022-2023), using the following biometric indicators: trunk cross-sectional area, number of shoots per tree, total shoot length, and average shoot length.

Effect of Land Shaping (Factor A)
Planting trees on ridge-modified terrain (a1) compared to flat terrain (a2) did not result in significant differences in any of the measured growth parameters during the two experimental years or in the average values across the entire period. On the contrary, in 2023, a distinctly significant reduction in trunk cross-sectional area was observed in the ridge-modified variant, which was lower by 1.23 cm²/tree compared to the flat terrain variant. This suggests that, under the specific soil and climatic conditions of the experimental site, ridge shaping did not provide a vegetative growth advantage during the early establishment years of the orchard.

Effect of Drip Irrigation (Factor B)
The application of localized irrigation (b1) - with 256 mm of water in the first year and 348 mm in the second year after planting - had a consistent and statistically significant positive influence on all vegetative growth parameters when compared to the non-irrigated variant (b2). The study conducted by Venig and Stănică (2024) highlights that the application of irrigation and fertilization in the nursery significantly stimulates the photosynthetic rate in plum trees, contributing to the production of vigorous planting material. These results support the idea that the 'Anna Späth' cultivar can also benefit from such agrotechnical measures during the early growth phase, especially under current climatic conditions marked by drought.
A very significant increase in trunk cross-sectional area (cm²/tree):

- by 0.86 in the first experimental year;
- by 1.77 in the second year;
- and by 1.31 on average over the two years.

A distinctly significant increase in the number of shoots/tree in the first year by 2.77, and a very significant increase in the second year by 3.07, resulting in an average increase of 2.92 shoots/tree over the two years.
A very significant increase in total shoot length (cm/tree):

- by 183.5 cm in the first year;
- by 358.6 cm in the second year;
- and by 271.0 cm on average over the two years.

A significant increase in average shoot length (cm):

- by 12.62 cm in the second year;
- and by 10.05 cm on average across both years.

These results confirm the efficiency of localized irrigation in supporting vegetative development during the initial years after planting, under conditions of limited and variably distributed natural precipitation. Recent studies conducted at the Moara Domnească Station confirm that drip irrigation has a significantly positive effect on vegetative growth in plum cultivars, especially in 'Anna Späth', which shows increased sensitivity to water deficit (Udrea-Braslă et al., 2024).

Effect of Rootstock Type (Factor C)

No statistically significant differences were observed between the two rootstocks used 'Mirobolan C5' (c1) and 'Adaptabil' (c2)—in any of the analyzed growth characteristics, neither in the individual experimental years nor in the average values across the two-year period. This indicates a comparable vegetative performance under the experimental conditions, despite the differences in rooting depth and architecture between the two rootstocks. The study conducted by Pal et al. (2017) demonstrated that the choice of rootstock has a significant impact on tree vigor, fruiting branch formation, and productivity in high-density orchards. The low-vigor rootstock 'Gisela 5' induced earlier fruiting and nearly doubled the yield compared to the traditional Mahaleb rootstock. These results support the importance of careful rootstock selection in plum cultivation as well, in order to control vegetative growth and enhance the economic efficiency of the orchard.

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