

ANATOMICAL BUILD-UP AND ITS CHANGES MEASURED IN VARIOUS PARTS OF INTERNODIUM OF WINTER WHEAT (*TRITICUM AESTIVUM* L.)

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Physical properties of the stem were influenced by the anatomical build-up of its internodes. These properties are important for lodging of crops and construction of the harvesting machines, etc.

The anatomical statements published so far by different authors are very difficult to compare because all authors took sections for their study not only from various internodes but also from different parts of the internodes.

I studied the build-up of the radial sections of lower, middle and upper part of the first internode for comparison and to explain the mutual relation among them.

Physical properties and the anatomical build-up of the first internode are very important for developing resistance against lodging.

MATERIALS AND METHODS

Samples for anatomical measurement were taken from sort Chlumecská 12 (lodging sort) and from Fanal (resistance for lodging is intermediate).

Three radial sections were taken from lower, middle and upper part of the internode and four different places (A, B, C, D) were studied from each of the three sections (Fig. 1).

Samples were taken at anthesis and at the time of full ripening. The measured values of three years obtained from 120 stems were statistically analyzed.

Measuring places were:

- a) lower part — 0.5 cm above roots,
- b) middle part — middle part of the internode,
- c) upper part — 1 cm under the first node.

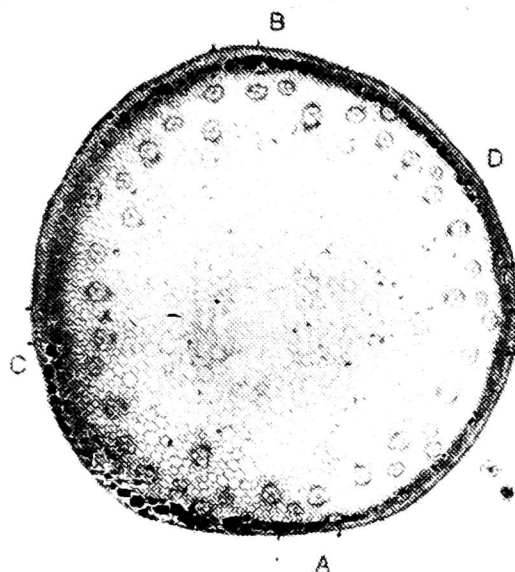


Fig. 1. Sort Fanal — A, B, C, D measuring places

Table 1

Sort Fanal

Statements followed	Anatomical characters studied								
	I	II	III	IV	V	VI	VII	VIII	IX
A	1.73	1.88	3.58	4.38	58.76	190.67	197.33		
B	2.88	2.73	4.81	5.70	62.38	191.59	198.20		
C	3.15	2.97	4.95	5.87	63.02	191.51	199.75		
D	3.11	2.83	4.97	5.87	62.80	192.30	200.60		
S	A—B	A—B	A—B	A—B	A—B		A—C		
	A—C	A—C	A—C	A—C	A—C	A—D	A—D		
	A—D	A—D	A—D	A—D	A—D		B—C		
	B—C								
	B—D	B—C					B—D		
a	3.39	3.06	5.65	6.42	74.76	186.49	196.28		
b	2.41	2.38	3.91	4.83	55.68	196.50	203.33	18.01	39.08
c	2.35	2.36	4.17	5.11	54.78	191.59	198.29		
S	a—b	a—b	a—b	a—b	a—b	a—b	a—b		
	a—c	a—c	a—c	a—c	a—c	a—c	a—c		
			b—c	b—c		b—c	b—c		

A, B, C, D — measuring places,

a, b, c — parts of internodes,

S — significant differences.

Figures of the Tables were obtained by using the parts of ocular scale (1 part of the scale = 16 μm).

Differences in anatomical statements of different measuring places (A, B, C, D) and various parts of internodes (a, b, c) are shown, at anthesis and at the time of full ripening.

Table 2

Sort Chlumecká 12

Statements followed	Anatomical characters studied								
	I	II	III	IV	V	VI	VII	VIII	IX
A	0.85	1.00	3.66	4.62	43.11	147.33	152.68		
B	2.49	2.49	4.38	5.56	49.28	148.37	153.72		
C	2.69	2.67	4.74	5.98	48.66	145.69	153.00		
D	2.79	2.73	4.92	6.10	48.99	146.71	154.07		
S	A—B	A—B	A—B	A—B	A—B	A—C	A—D		
	A—C	A—C	A—C	A—C	A—C	B—C			
	A—D	A—D	A—D	A—D	A—D	B—D			
	B—C		B—C	B—C					
	B—D	B—D	B—D	B—D	A—D				
a	2.86	2.86	4.90	6.10	55.31	144.65	152.34		
b	1.93	1.95	4.04	5.15	43.91	150.24	156.09	75.63	29.94
c	1.82	1.86	4.33	5.46	43.31	146.04	151.71		
S	a—b	a—b	a—b	a—b	a—b	a—b	a—b		
	a—c	a—c	a—c	a—c	a—c	a—c			
		b—c	b—c		b—c	b—c			

Explanations as in Table 1.

Differences in anatomical statements, of different measuring places (A, B, C, D) and various parts of internodes (a, b, c) are shown at anthesis and at the time full ripening.

Anatomical characters studied:

- I. Width of cortex parenchyma.
- II. Number of cells rows of cortex parenchyma.
- III. Width of sclerenchymatic band.
- IV. Number of cells rows in sclerenchymatic band.
- V. Width of the stem-wall.
- VI. Average of the sclerenchymatic band.
- VII. Average of the stem.
- VIII. Number of small vascular bundles of sclerenchymatic band.
- IX. Number of big vascular bundles of pith parenchyma.

RESULTS AND DISCUSSION

The anatomical measuring showed that radial arrangement of tissue is considerably influenced by the insertion of the leaf sheath. In the places where it adhered to the internode the width of parenchyma of the cortex sclerenchymatic band and stem-wall were reduced. This influence was best observed in the lower part of the internode. Similar results were obtained in the second internode by Iljinskaja-Centilovič and Teterjatčenko [3]. Their results showed that in the places where the leaf sheath adhered the sclerenchymatic band is narrower and nearer to the epiderma.

Very substantial differences were found between the anatomical build-up of the individual internode sections (low, middle and upper). The most considerable differences existed between lower and middle sections. The lower section of internode exhibited broader parenchyma of the cortex, broader sclerenchymatic band and thicker stem-wall. Tissues of the lower part of internode were closer to the longitudinal axis than in the case of the middle and upper parts.

The given data were found by us in stems at the time of anthesis and at full ripening.

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ZMIENNOŚĆ BUDOWY ANATOMICZNEJ W RÓŻNYCH CZĘŚCIACH
MIĘDZYWĘZŁA PSZENICY OZIMEJ

Streszczenie

Budowa anatomiczna międzywęzła decyduje o cechach fizycznych źdźbeł. Na radialne rozmieszczenie tkanek w międzywęzłach oddziałuje pochwa liściowa. W miejscu, gdzie przylega ona do międzywęzła, obserwuje się mniejszą szerokość warstwy parenchymatycznej, pasa sklerenchymatycznego oraz ścianki źdźbła. Wpływ ten jest najbardziej dostrzegalny w dolnej części międzywęzła.

Znaczne różnice występują w budowie anatomicznej poszczególnych między-

węzli (w części dolnej, środkowej i górnej źdźbła). Najwyraźniej różni się część dolna źdźbła od środkowej. Dolne odcinki źdźbła posiadają szersze warstwy parenchymy, większy pas sklerenchymatyczny oraz grubsze ścianki źdźbła. Tkanki dolnej części międzywęzła zajmują miejsce bliżej podłużnej osi międzywęzła niż tkanki środkowej i górnej części źdźbła.

Badania przeprowadzone u źdźbeł pszenicy ozimej w fazie kłoszenia i dojrzałości pełnej. Stwierdzono istotne różnice w budowie anatomicznej między poszczególnymi częściami źdźbła, nawet przy zastosowaniu wysokich dawek CCC.

В. Новак

ИЗМЕНЧИВОСТЬ АНАТОМИЧЕСКОГО СТРОЕНИЯ СТЕБЛЯ В РАЗНЫХ ЧАСТЯХ МЕЖДОУЗЛИЯ ОЗИМОЙ ПШЕНИЦЫ

Резюме

На физические свойства стеблей воздействует анатомическое строение междоузлий. На радиальное размещение тканей в междоузлиях воздействует влагище листа. На месте, где влагище примыкает к междоузлию, наблюдается меньшая ширина коровой паренхимы, склеренхиматического пояса и стенки стебля. Это влияние наиболее заметно в нижней части междоузлия.

Значительные различия были обнаружены между анатомическим строением отдельных частей междоузлий (нижней, центральной и верхней). Больше всего отличалась нижняя часть от центральной. Коровая паренхима, склеренхиматический пояс и стенки стебля нижней части были более широки. Ткани этой части междоузлия находились ближе к продольной оси междоузлия чем ткани центральной и верхней частей.

Приведенные данные измерялись у стеблей в фазах колошения и полной спелости. Различия между разными частями междоузлий отмечались и после очень сильного сокращения междоузлий в результате действия высокой дозы хлоридхлорохолина.

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