

Mendel University in Brno

Faculty of Agronomy

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**Effect of different terms of
sowing of grasses and legumes
on their initial development.**

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Autumn sowing terms in spring 2010

10 different
specieses grass
and clovers

Lolium perenne

Festuca rubra (3 ssp)

Festuca ovina

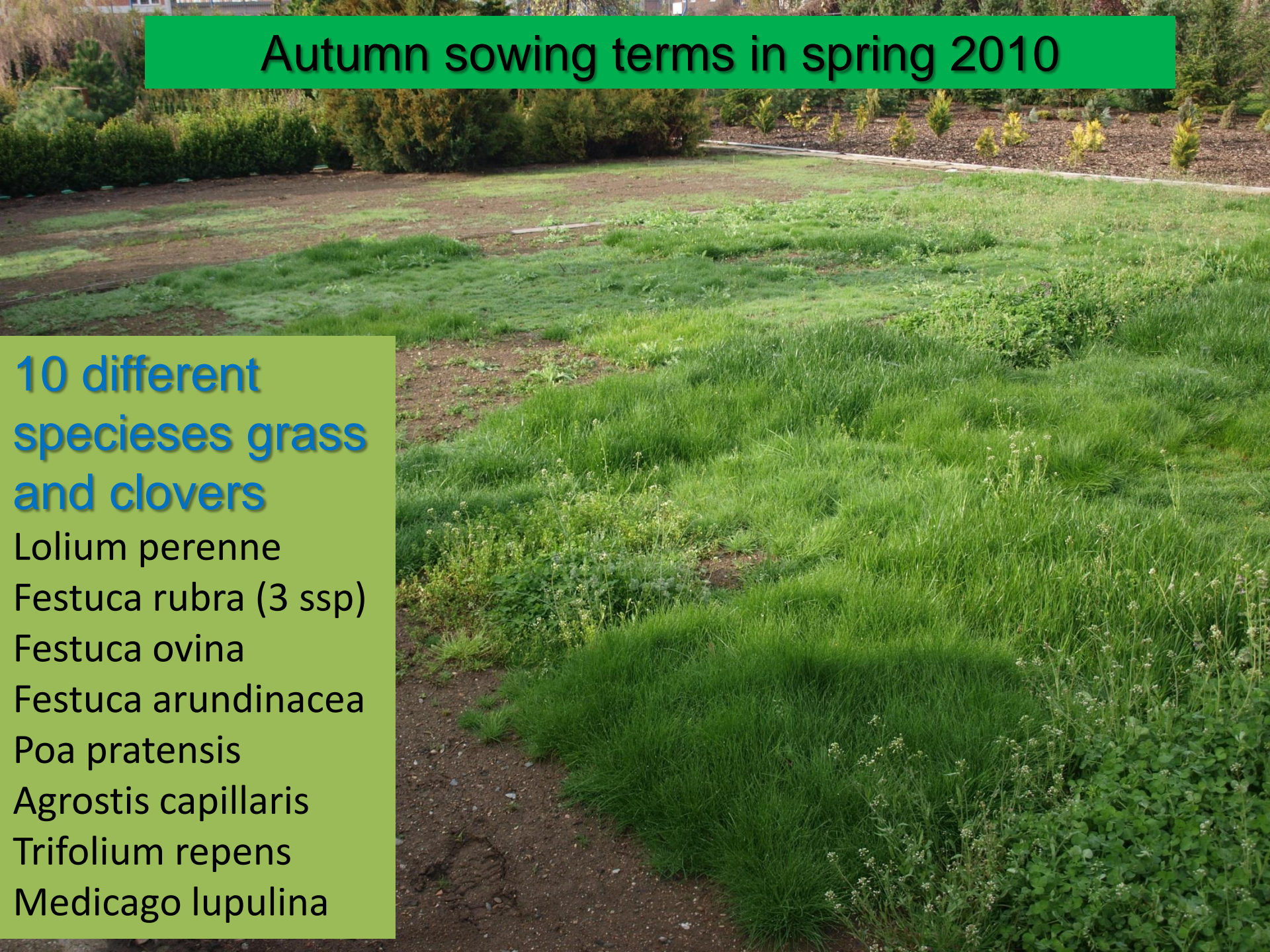
Festuca arundinacea

Poa pratensis

Agrostis capillaris

Trifolium repens

Medicago lupulina

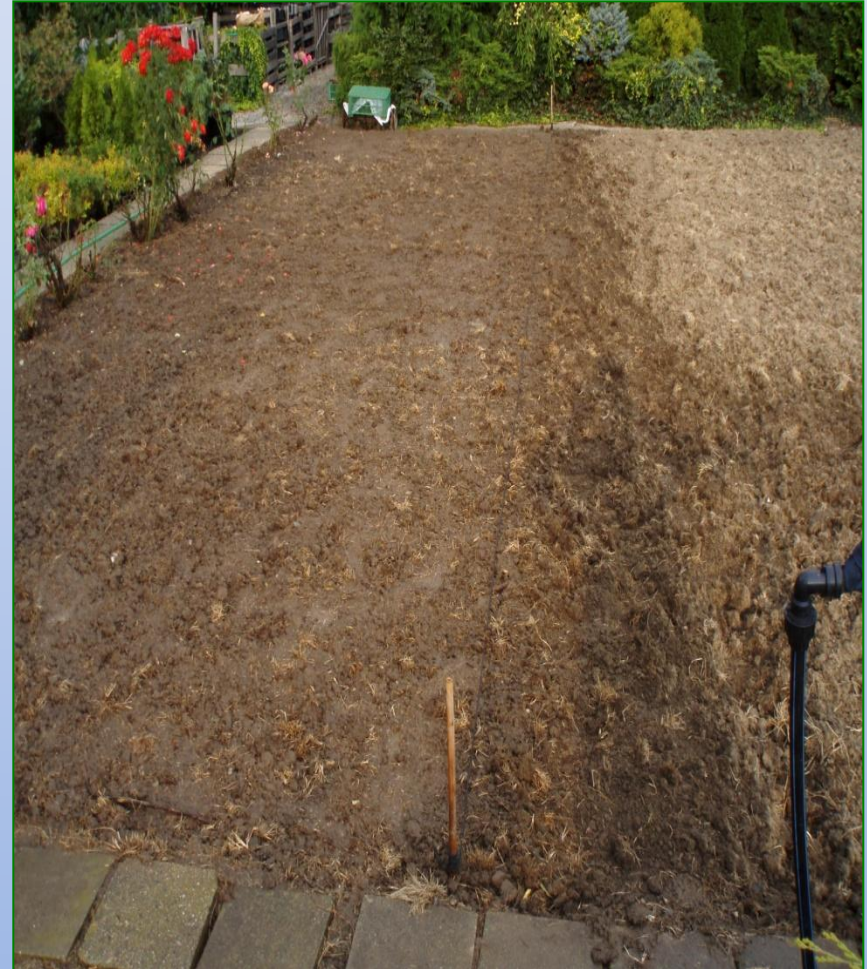


Used species

	Species	Sowing rate g/m ²
1	<i>Lolium perenne</i>	25
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	25
3	<i>Festuca rubra</i> <i>trichophylla</i>	25
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	25
5	<i>Festuca ovina</i>	25
6	<i>Poa pratensis</i>	15
7	<i>Agrostis capillaris</i>	10
8	<i>Festuca arundinacea</i>	30
9	<i>Trifolium repens</i>	4
10	<i>Medicago lupulina</i>	4

Establishment of experiment

Otrokovice 2009/2010



Terms of sowing

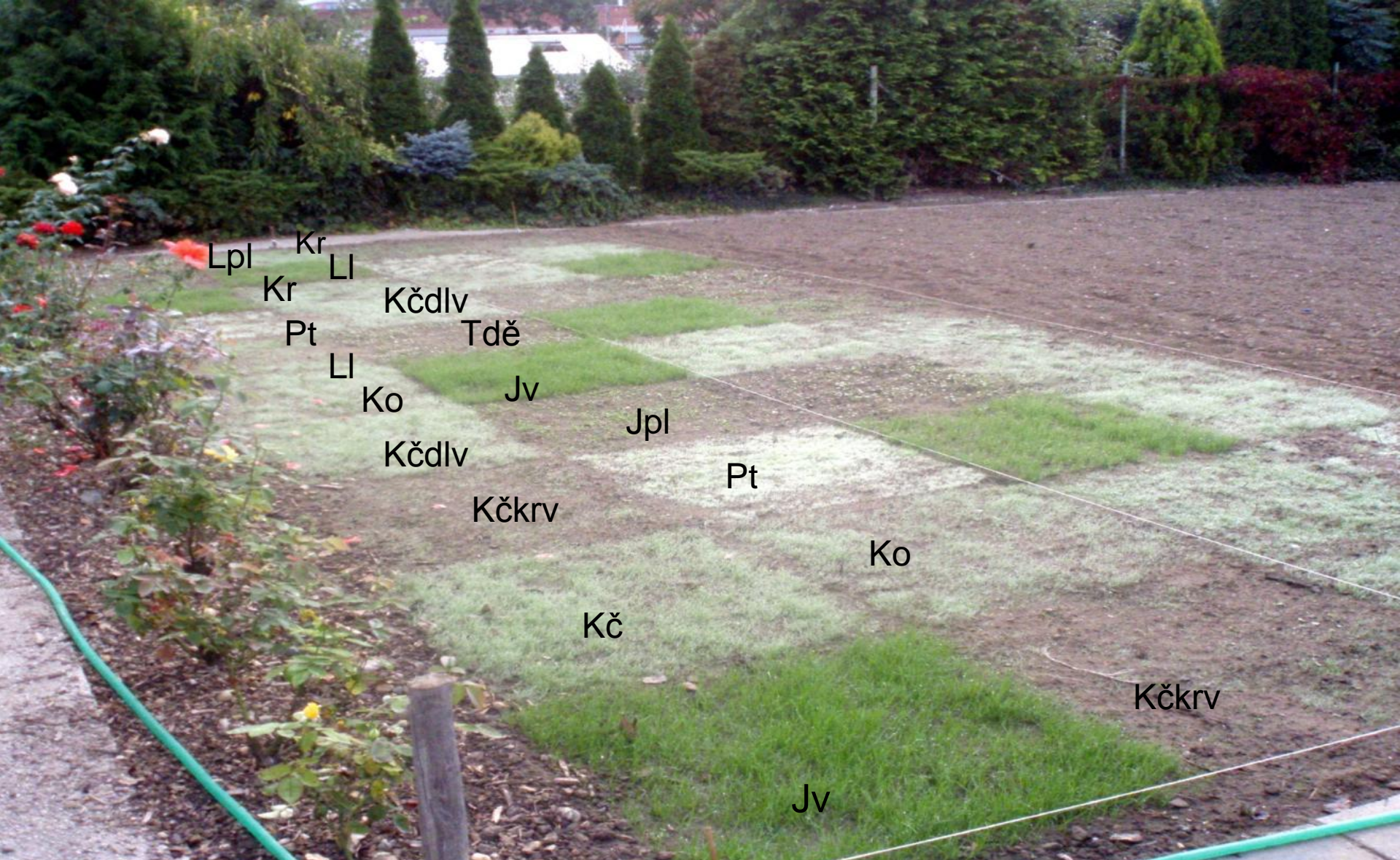
- Beginning of September 09, 10
- Beginning of October 09, 10
- Beginning of November 09, 10
- Beginning of April 10

Assessment parameters of turfs - autumn 2009, April 2010

- **speed of germination**
- **soil cover in time intervals**
- **state after winter**
- **height of plants**
- **temperature of leaves** (temperature stress)



Sowing



Lpl Kr LI
 Kr LI Kčdlv
 Pt Tdě
 LI Ko Jv
 Kčdlv Jpl
 Kčkrv Pt
 Ko
 Kč
 Kčkrv
 Jv

Sowing 3.9. 2009
Rated 21.9. 2009

Temperature, rainfall

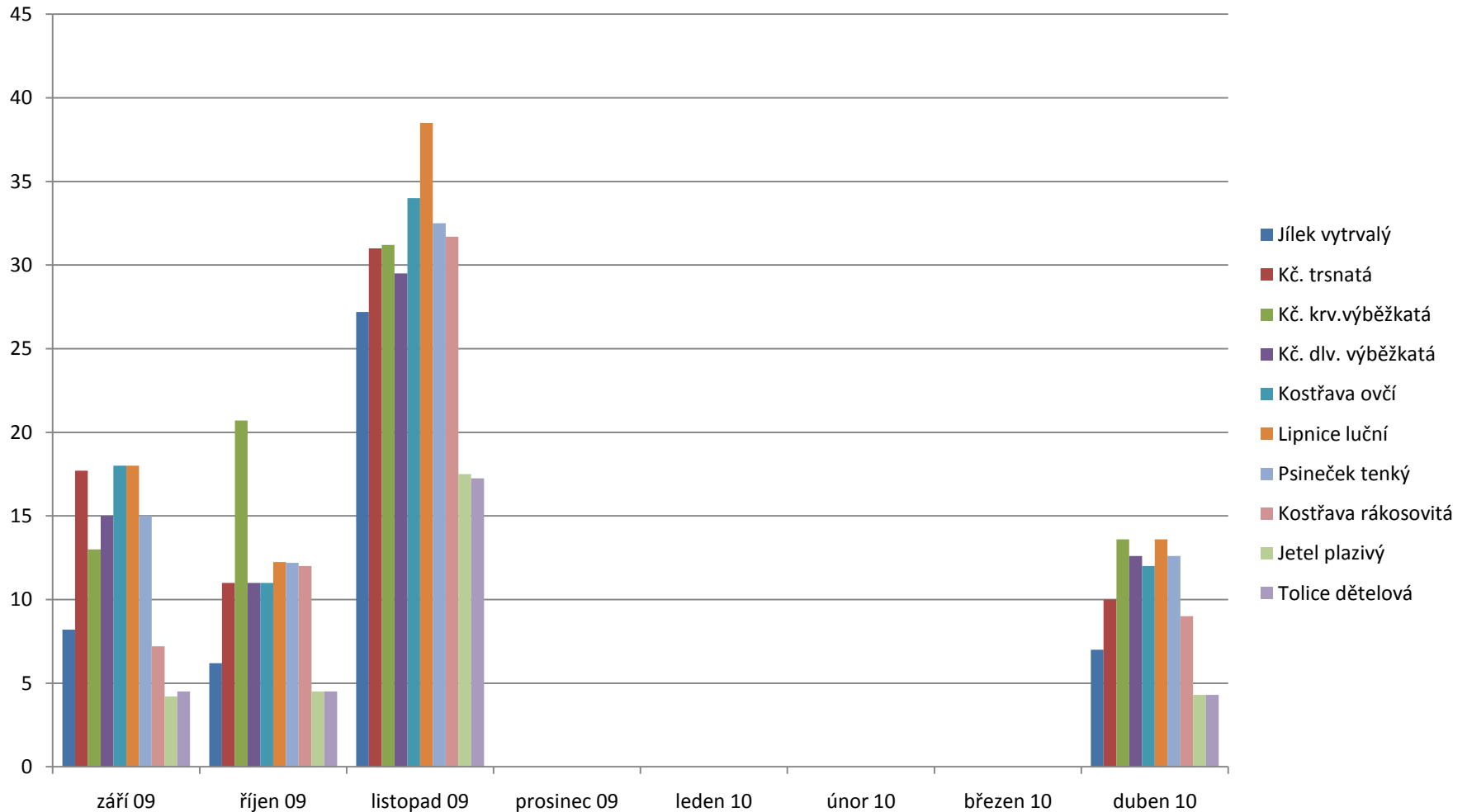
	2009		2010	
month:	Tem.(°C)	rainfall (mm)	Tem. (°C)	rainfall (mm)
January	-4,3	31	-4,7	48
February	-0,4	62	-1,0	31
March	3,9	62	4,2	8
<u>April</u>	13,4	3	8,5	44
May	14,9	92	13,3	200
June	16,8	67	18,4	81
July	20,7	85	21,8	105
August	20,8	37	19,3	76
<u>September</u>	17,4	21	13,1	79
<u>October</u>	8,7	35	6,9	16
<u>November</u>	5,8	53	6,6	53
December	0,1	40	-4,1	42
Average	9,8	588	8,8	783

Results

Speed of emergence in days

	Species / temperature °C	Septe/ 09 17,4	Octo/ /09 8,7	Novemb er/09 5,8	April /10 8,5	Aver age
1	<i>Lolium perenne</i>	8,2	6,2	27,2	7	12,2
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	17,7	11	31	10	17,4
3	<i>Festuca rubra trichophylla</i>	13	20,7	31,2	13,6	19,7
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	15	11	29,5	12,6	17,0
5	<i>Festuca ovina</i>	18	11	34	12	18.8
6	<i>Poa pratensis</i>	18	12,25	38,5	13,6	20,6
7	<i>Agrostis capillaris</i>	15	12,2	32,5	12,6	18,1
8	<i>Fectuca arundinacea</i>	7,2	12	31,7	9	15
9	<i>Trifolium repens</i>	4,2	4,5	17,5	4,3	7,6
10	<i>Medicago lupulina</i>	4,5	4,5	17,25	4,3	7.6

Speed of emergence in days



Temper. °C

September/09

17,4

October/09

8,7

November/09

5,8

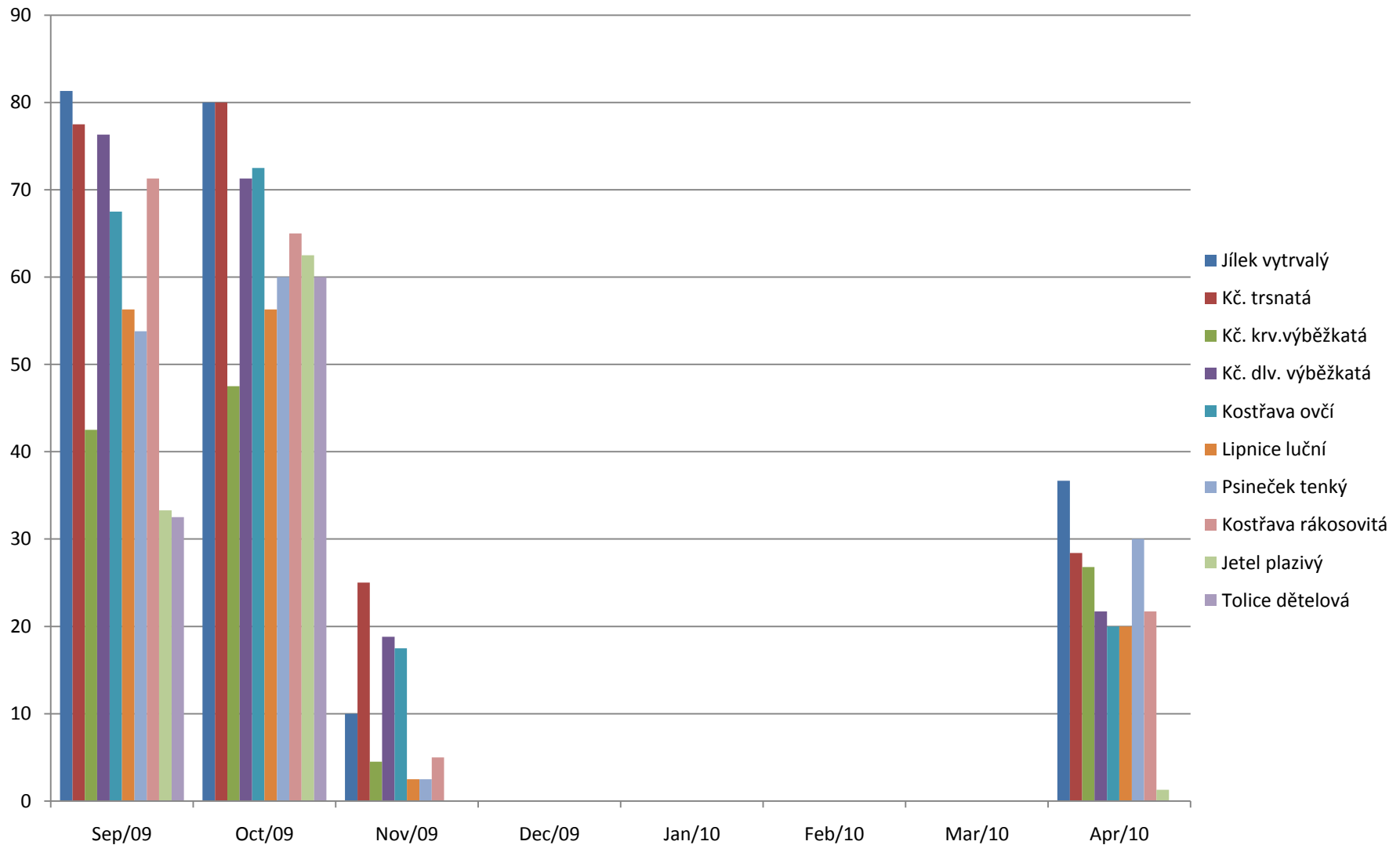
April /10

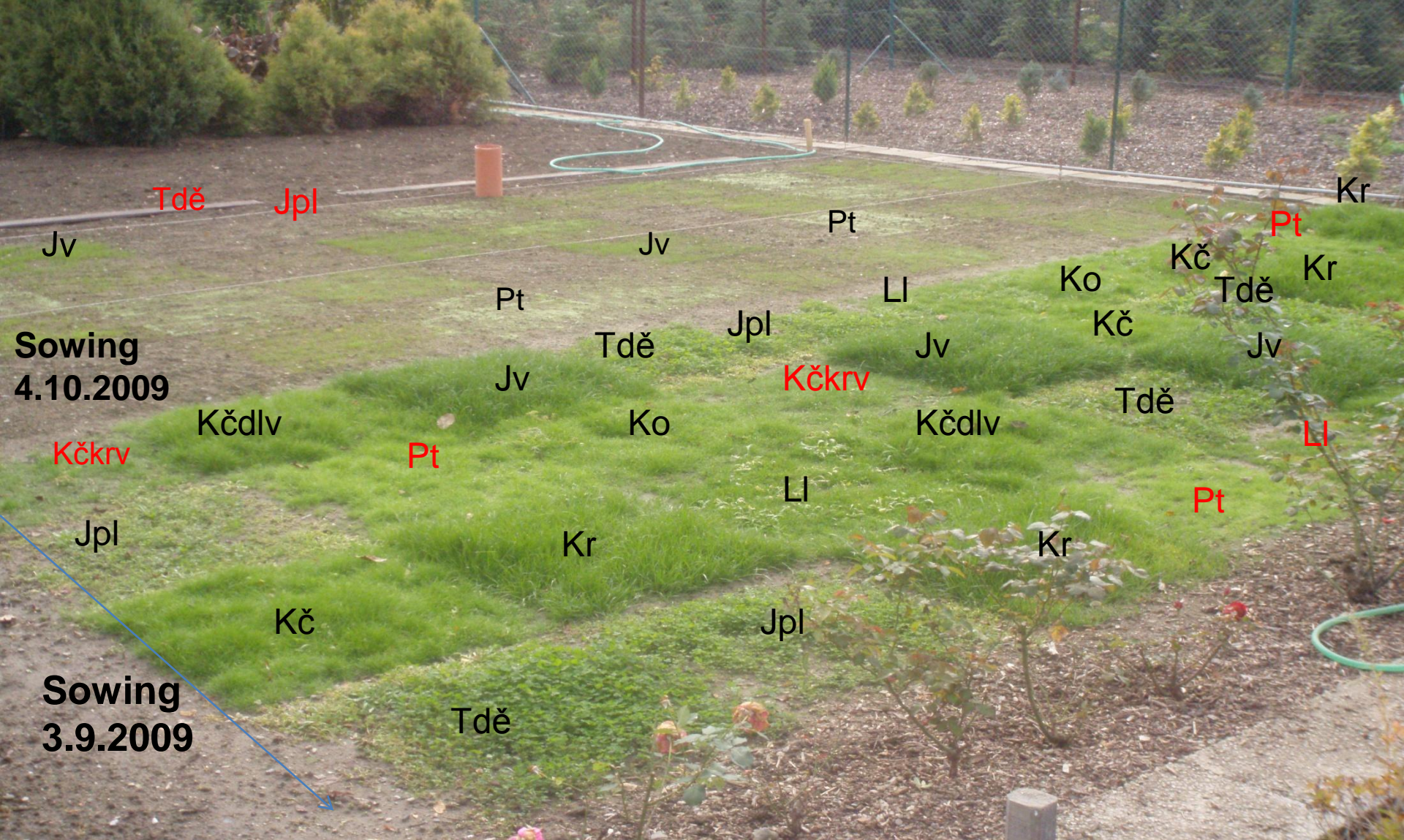
8,5

Soil cover in time intervals,

	Species	September/09	October/09	November/09	April/10	Average
1	<i>Lolium perenne</i>	81,3	80	10	36,67	51,9
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	77,5	80	25	28,4	52,7
3	<i>Festuca rubra</i> <i>trichophylla</i>	42,5	47,5	4,5	26,8	30,3
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	76,3	71,3	18,8	21,7	46,9
5	<i>Festuca ovina</i>	67,5	72,5	17,5	20	44,4
6	<i>Poa pratensis</i>	56,3	56,3	2,5	20	33,8
7	<i>Agrostis capillaris</i>	53,8	60	2,5	30	36,6
8	<i>Festuca arundinacea</i>	71,3	65	5	21,7	40,7
9	<i>Trifolium repens</i>	33,3	62,5	0	1,3	24,3
10	<i>Medicago lupulina</i>	32,5	60	0	0	23,1

Soil cover in time intervals, rated 19.9.2009, 18.4.2010 (%)





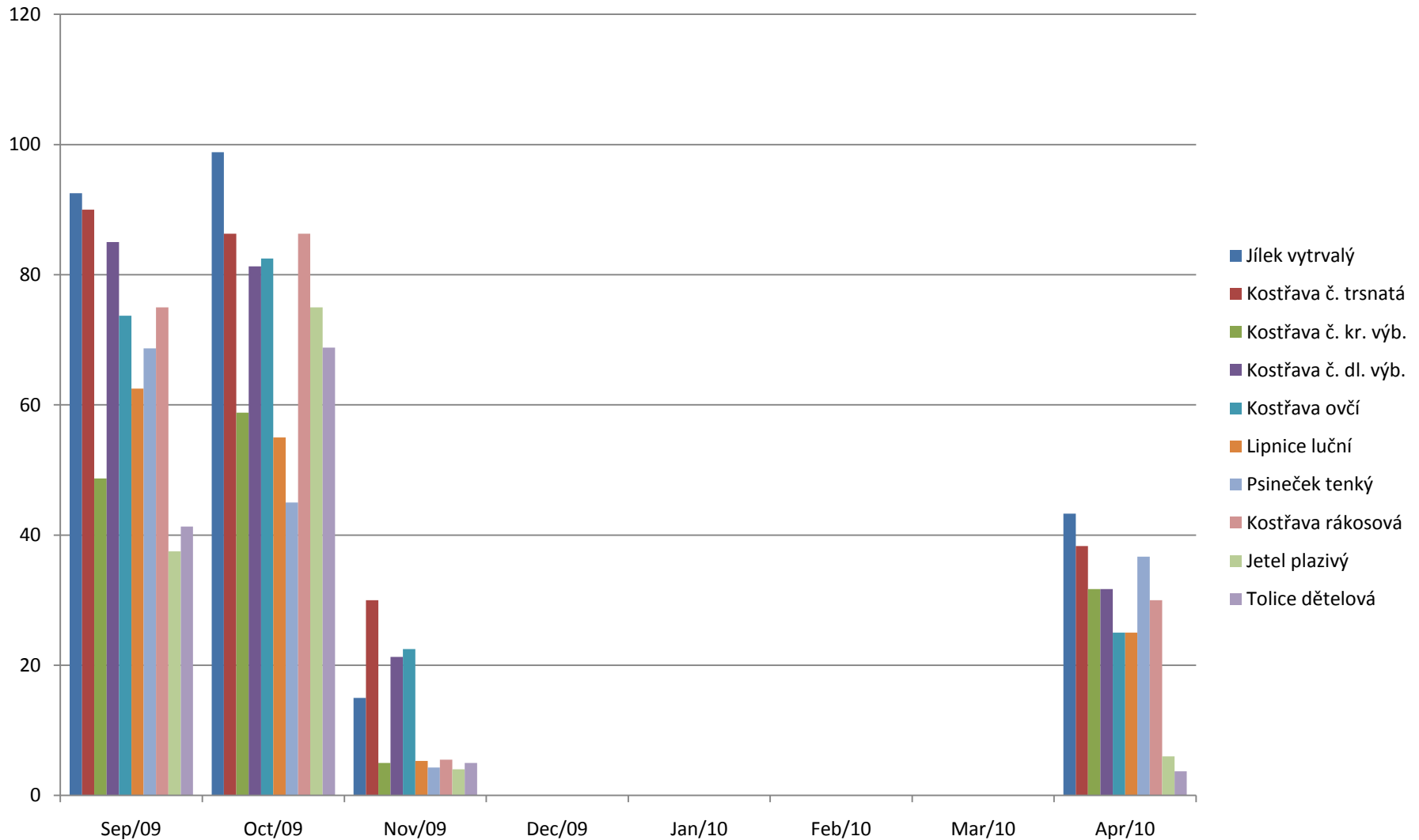
Autumn term of sowing 2009

Rated 2.11.2009

Soil Cover in time intervals , rated 7.10.2009, 5.5.2010 (%)

	species	September/ 09	October/ 09	November/0 9	April /10	diameter
1	<i>Lolium perenne</i>	92,5	98,8	15	43,3	62,4
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	90	86,3	30	38,3	61,1
3	<i>Festuca rubra</i> <i>trichophylla</i>	48,7	58,8	5	31,7	36
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	85	81,3	21,3	31,7	54,8
5	<i>Festuca ovina</i>	73,7	82,5	22,5	25	50,9
6	<i>Poa pratensis</i>	62,5	55	5,3	25	36,9
7	<i>Agrostis capillaris</i>	68,7	45	4,3	36,7	38,7
8	<i>Fectuca arundinacea</i>	75	86,3	5,5	30	49,2
9	<i>Trifolium repens</i>	37,5	75	4	6	30,6
10	<i>Medicago lupulina</i>	41,3	68,8	5	3,7	29,7

Soil Cover in time intervals , rated 7.10.2009, 5.5.2010 (%)



Rating 2.11. 2009



October/09

September/09

Success of wintering

2222

Rated- 22.2.2010

Kr

Aver.temper.⁰C

December /09

0.1

January/10

-4,7

February/10

-1,0

March/10

4,2

Aver.height snow.cover (mm)

210,5

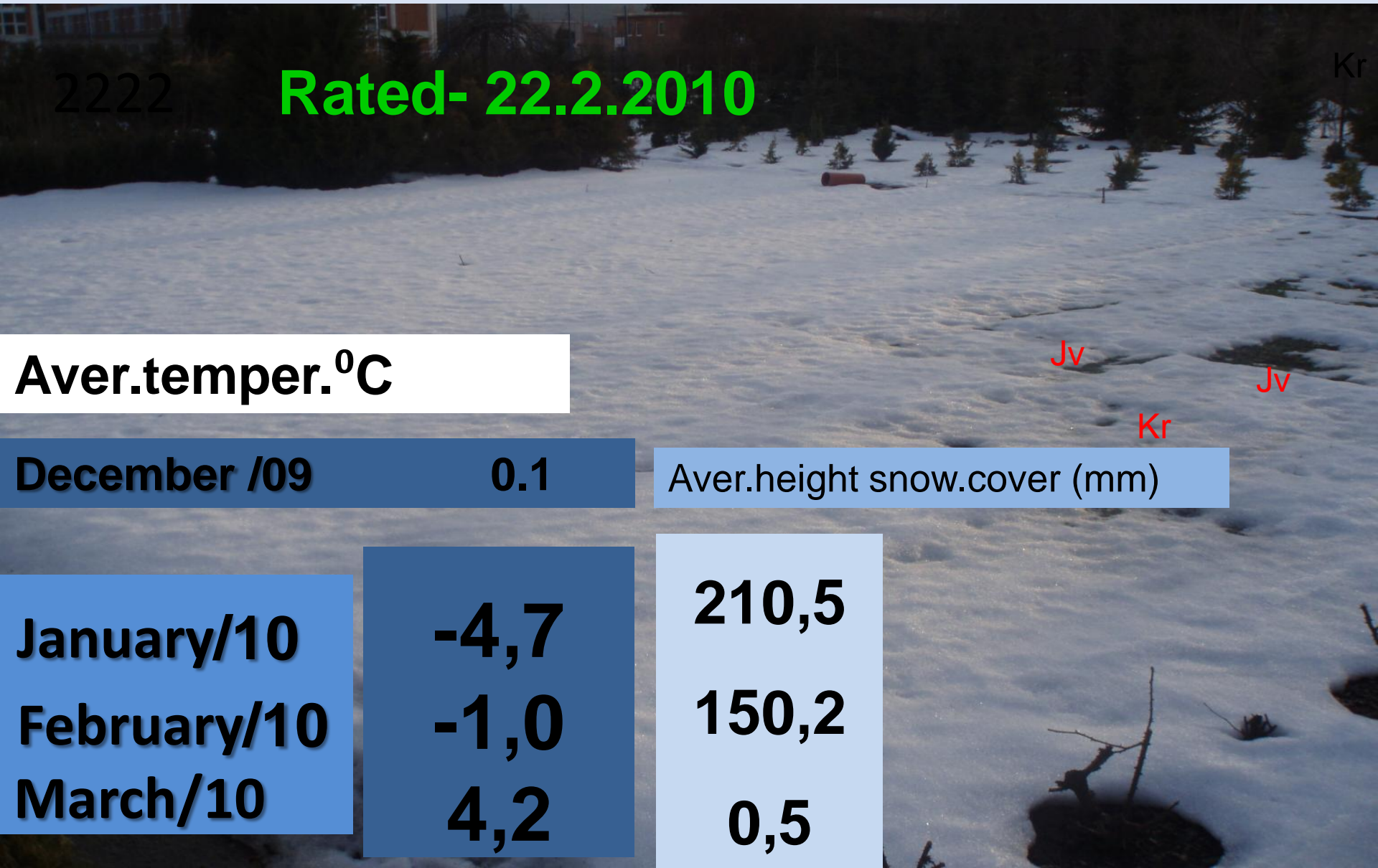
150,2

0,5

Jv

Jv

Kr



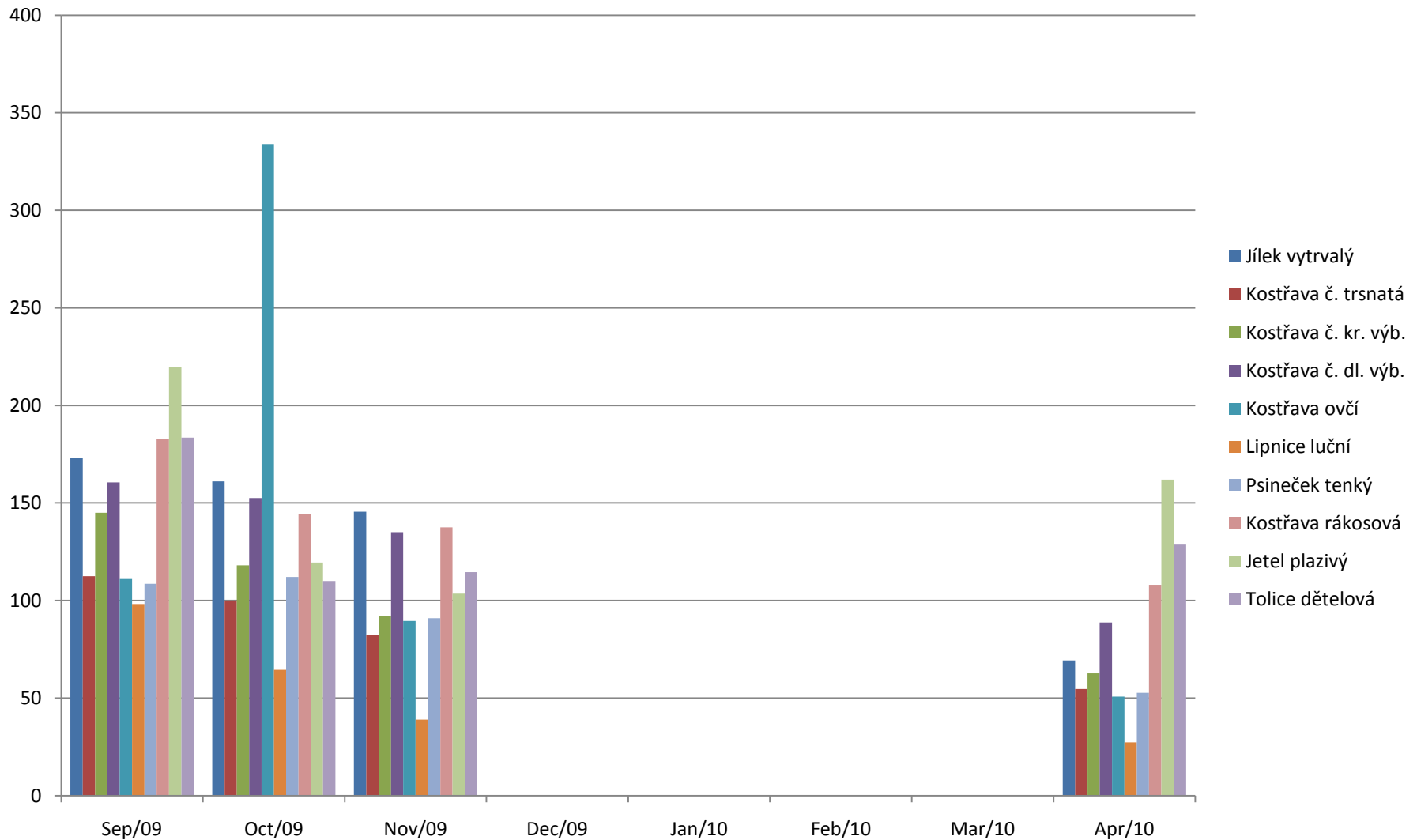


**Sowing 3.11. 2009,
rated 28.4.2010**

Height of plants, rated 13.7.2010 (mm)

	species	Septemb er/09	October/0 9	Novem ber/09	April /10	Average
1	<i>Lolium perenne</i>	173	161	145,5	69,3	137,2
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	112,5	100	82,5	54,7	87,4
3	<i>Festuca rubra trichophylla</i>	145	118	92	62,7	104,4
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	160,5	152,5	135	88,7	134,2
5	<i>Festuca ovina</i>	111	334	89,5	50,7	146,3
6	<i>Poa pratensis</i>	98,2	64,5	39	27,3	57,3
7	<i>Agrostis capillaris</i>	108,5	112	91	52,7	91
8	<i>Fectuca arundinacea</i>	183	144,5	137,5	108	143,3
9	<i>Trifolium repens</i>	219,5	119,5	103,5	162	151,1
10	<i>Medicago lupulina</i>	183,5	110	114,5	128,7	134,2

Height of plants, rated 13.7.2010 (mm)



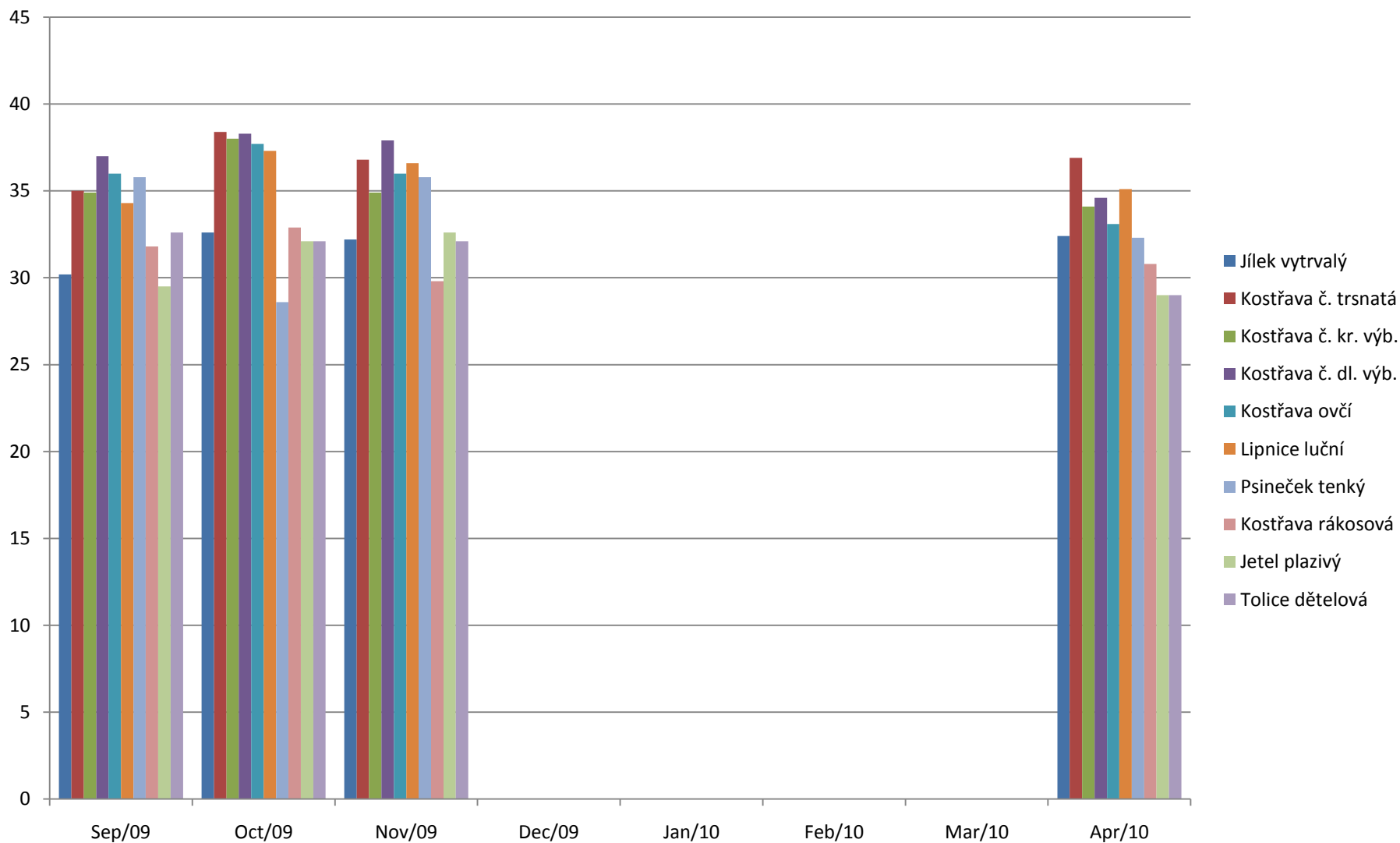
Air temperature: 35,2

Concrete surface temperature : 42,7

Temperature stress 13.7.2010

	Species	September/09	October/09	November/09	April /10	Average
1	<i>Lolium perenne</i>	30,2	32,6	32,2	32,4	31,9
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	35	38,4	36,8	36,9	36,8
3	<i>Festuca rubra</i> <i>trichophylla</i>	34,9	38	34,9	34,1	35,5
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	37	38,3	37,9	34,6	37
5	<i>Festuca ovina</i>	36	37,7	36	33,1	35,7
6	<i>Poa pratensis</i>	34,3	37,3	36,6	35,1	35,9
7	<i>Agrostis capillaris</i>	35,8	28,6	35,8	32,3	33,1
8	<i>Festuca</i> <i>arundinacea</i>	31,8	32,9	29,8	30,8	31,3
9	<i>Trifolium repens</i>	29,5	32,1	32,6	29	30,8
10	<i>Medicago lupulina</i>	32,6	32,1	32,1	29	31,6

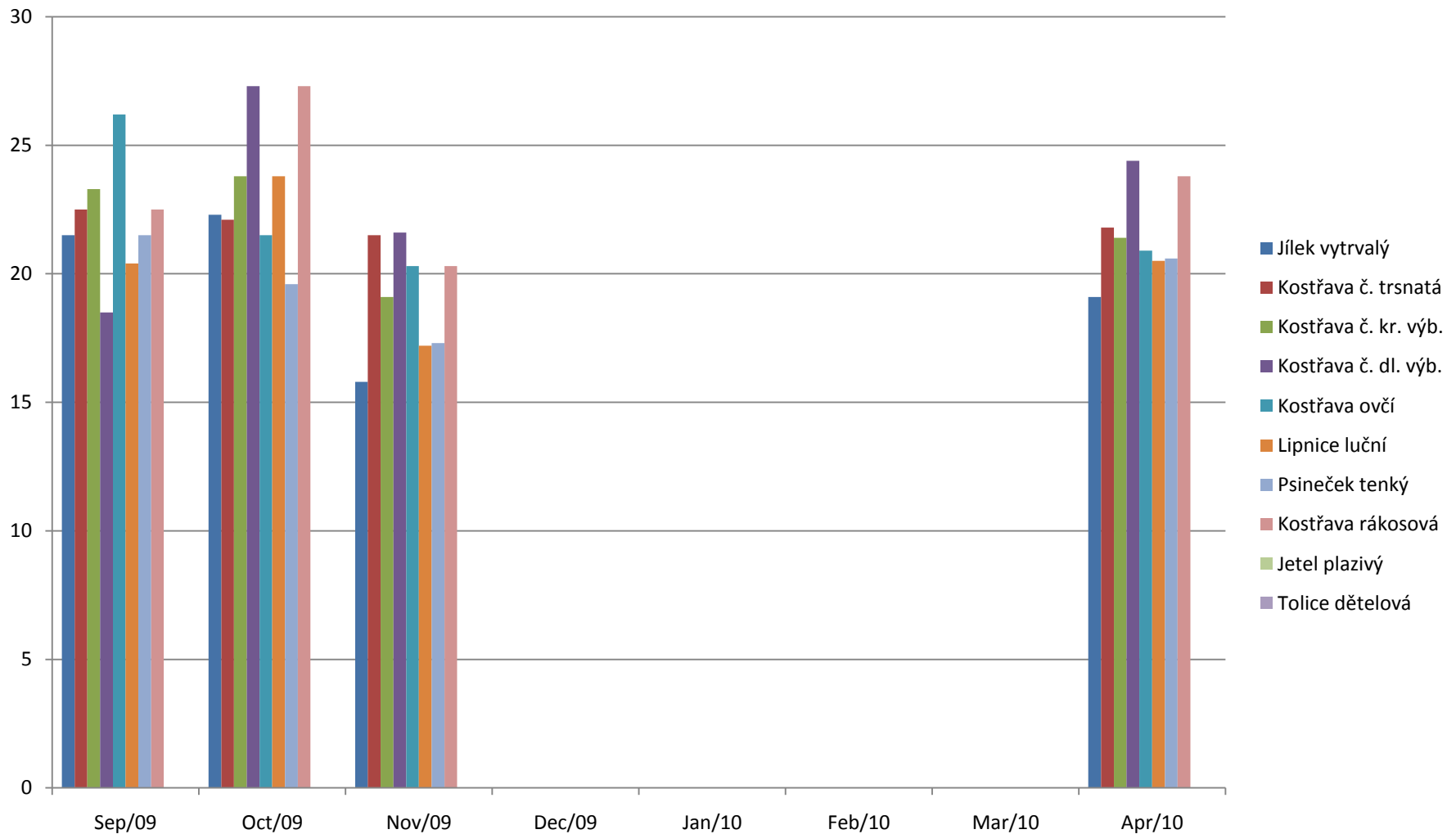
Temperature stress, rated - 13.7.2010



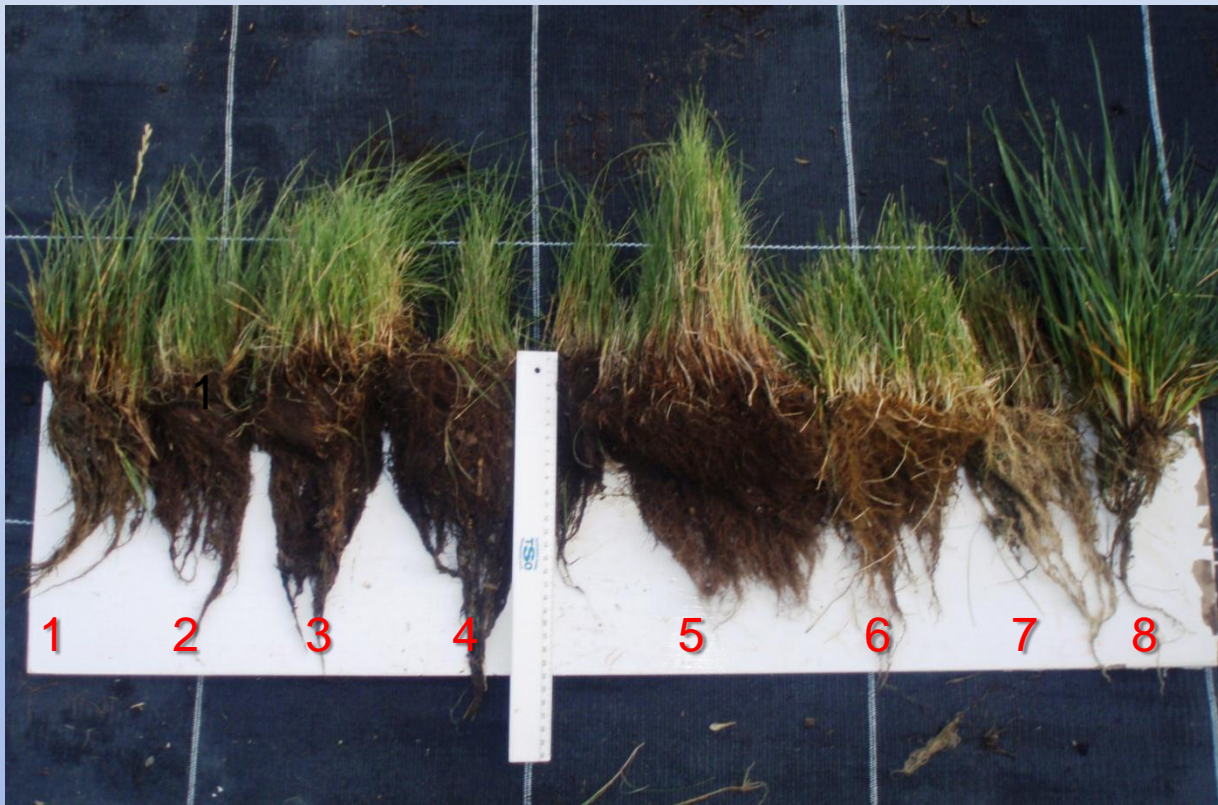
Depth of rooting rated 14.8.2009 (mm)

	Species	September /09	October/ 09	Novembe r/09	April /10	Average
1	<i>Lolium perenne</i>	21,5	22,3	15,8	19,1	19,7
2	<i>Festuca rubra</i> subsp. <i>commutata</i>	22,5	22,1	21,5	21,8	22,0
3	<i>Festuca rubra trichophylla</i>	23,3	23,8	19,1	21,4	21,9
4	<i>Festuca rubra</i> subsp. <i>rubra</i>	18,5	27,3	21,6	24,4	22,9
5	<i>Festuca ovina</i>	26,2	21,5	20,3	20,9	22,2
6	<i>Poa pratensis</i>	20,4	23,8	17,2	20,5	20,5
7	<i>Agrostis capillaris</i>	21,5	19,6	17,3	20,6	19,7
8	<i>Fectuca arundinacea</i>	22,5	27,3	20,3	23,8	23,4
9	<i>Trifolium repens</i>	not rated				
10	<i>Medicago lupulina</i>	not rated				

Depth of rooting rated 14.8.2009 (mm)



Depth of rooting sowing – 9/2009 rated-14.8.2010



1. *Lolium perenne*
2. *Festuca rubra* subsp. *commutata*
3. *Festuca rubra* *trichophylla*
4. *Festuca rubra* subsp. *rubra*
5. *Festuca ovina*
6. *Poa pratensis*
7. *Agrostis capillaris*
8. *Festuca arundinacea*

Depth of rooting sowing -10/ 2009 rated-14.8.2010



1. *Lolium perenne*
2. *Festuca rubra* subsp. *commutata*
3. *Festuca rubra* *trichophylla*
4. *Festuca rubra* subsp. *rubra*
5. *Festuca ovina*
6. *Poa pratensis*
7. *Agrostis capillaris*

Depth of rooting sowing-11/ 2009 rated-14.8.2010



1. *Lolium perenne*
2. *Festuca rubra* subsp. *commutata*
3. *Festuca rubra* *trichophylla*
4. *Festuca rubra* subsp. *rubra*
5. *Festuca ovina*
6. *Poa pratensis*
7. *Agrostis capillaris*

Establishment of experiment

Otrokovice 2010/2011



Assessment parameters after sowing - autumn 2009

- **success of wintering**
- **covering in time intervals**

Weather conditions / comparison

2009

2010

September

17,4

21

13,1

79

October

8,7

35

6,9

16

November

5,8

53

6,6

53

Success of wintering

Aver.temp.

December/010 -4,1

January/011 -1

February/011 -1,9

March /011 2,2



Aver.height snow.cover (mm)

December /010 -50-100 mm

January/ 11 0 mm

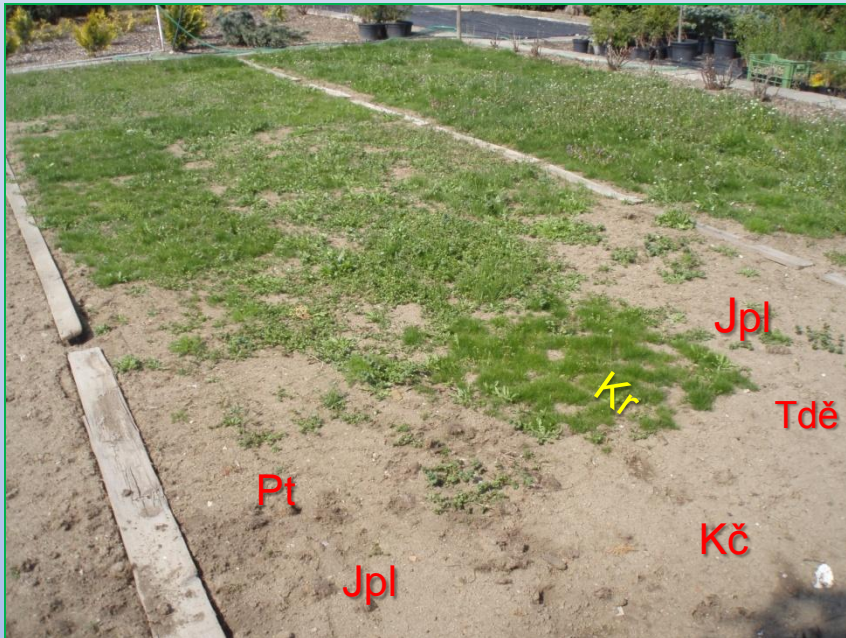
February/11 0 mm

March/011 0 mm

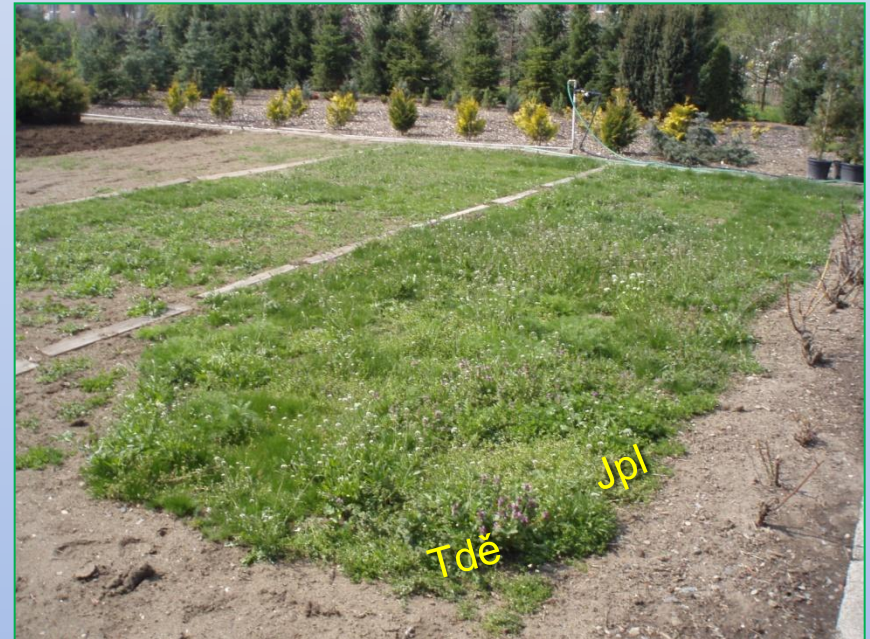


Success of wintering 2010/2011

Sowing XI./ 2010



Sowing IX./ 2010



Rated 19.4. 2011

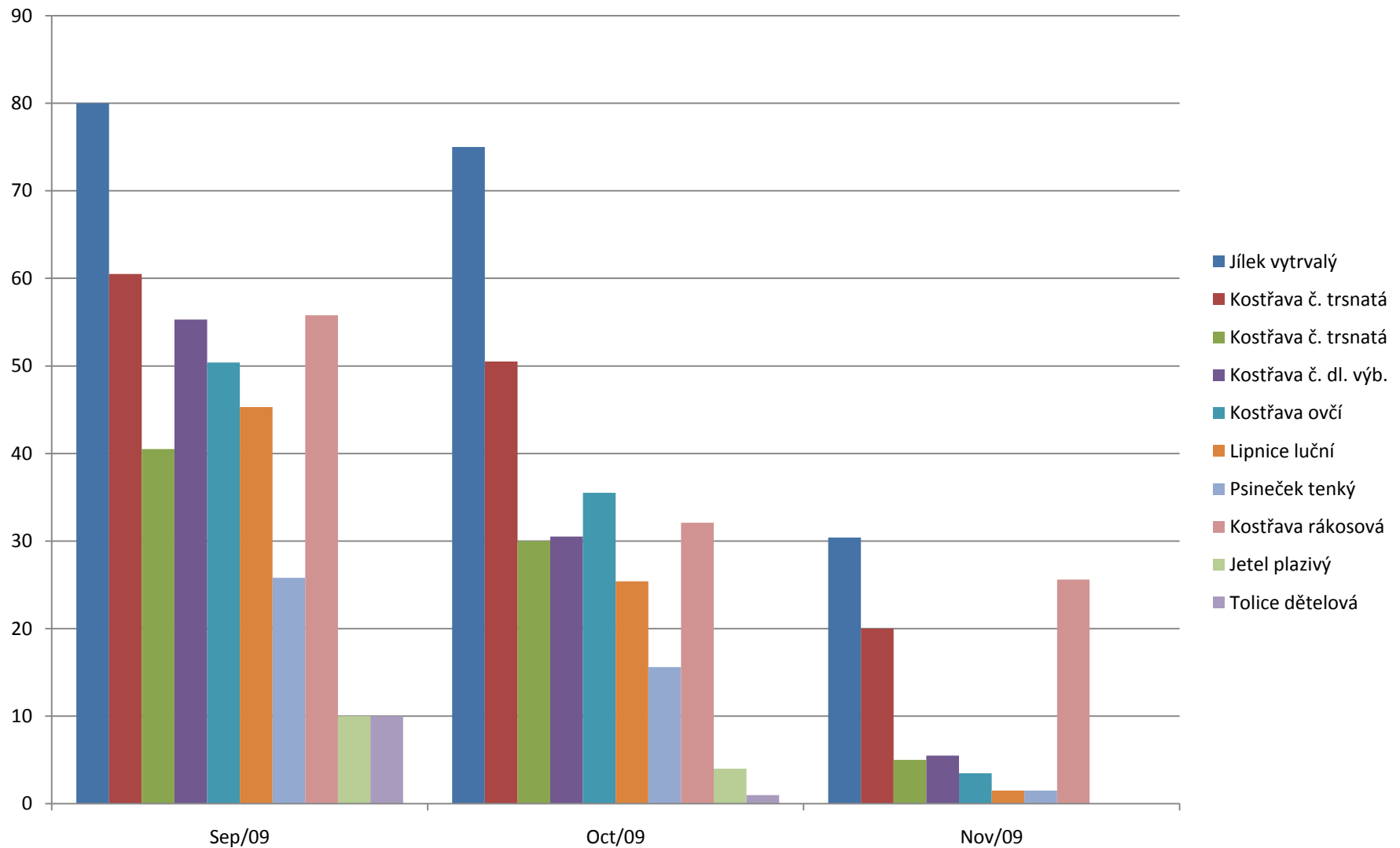
Sowing XI./ 2010, rated 19.4.2011



Soil cover in time intervals,rated 19.4.2011

	Species	Septemb/09	October/09	Novemb/09	Average
1	<i>Lolium perenne</i>	80	75	30,4	35,1
2	<i>Festuca rubra</i> <i>subsp. commutata</i>	60,5	50,5	20	43,7
3	<i>Festuca rubra</i> <i>trichophylla</i>	40,5	30	5	25,1
4	<i>Festuca rubra</i> <i>subsp. rubra</i>	55,3	30,5	5,5	30,4
5	<i>Festuca ovina</i>	50,4	35,5	3,5	29,8
6	<i>Poa pratensis</i>	45,3	25,4	1,5	24
7	<i>Agrostis capillaris</i>	25,8	15,6	1,5	14,3
8	<i>Fectuca</i> <i>arundinacea</i>	55,8	32,1	25,6	22,7
9	<i>Trifolium repens</i>	10	4	0	4,7
10	<i>Medicago lupulina</i>	10	1	0	3,7

Soil cover in time intervals, rated 19.4.2011 (%)



speed of germination

is affected by

- grass species
- soil moisture
- soil temperature

- Sowing in September is suitable for all tested grass and legumes.
- Sowing in November is risky for success of overwintering.

success of wintering

is affected by

- **sowing period**
- **height snow cover (mm)**
- **used grass species**
- **November sowing term is too risky**

Soil cover of turfgrasses

is affected by

- **sowing period** (+Sept., April, -Nov.)
- **used grass species** (+ Lp., Fa., Fr., - Tr., Ml.)
- **course of wintering** (+Lp., Fa., Fr.com., - Tr.,
Ml., At.)

Thank you for your
attention