



Seed rate guide

Maris Piper



Cambridge
University
Farm

What's new?

Previous seed rate guides have offered recommendations simply to optimise total yield from ware production. This new guide, based on Potato Council-funded research, recognises the importance of tuber size to the value of your crop. It also accounts for the effect of seed age on main-stem numbers and their influence in determining optimum seed rate.

How do I influence stem numbers?

Years of research at Cambridge University Farm (CUF) have refined understanding of the relationship between the number of stems produced and seed size. Recent research has quantified how seed age, measured as the period from emergence of the seed crop to planting of the ware crop, also has an influence. These findings have been distilled into these recommendations, which account for both seed age and size. For example, to produce more stems at the same plant population (within-row spacing) you should use older and/or larger seed.

How will this help?

Based on your target yield and optimum tuber size, you can use this guide to estimate required plant density and seed rate. This will help maximise the value of your crop through increasing yield of the desired size. Maris Piper, for example, is usually grown with the aim of producing a crop with a high proportion of large tubers where the tuber size distribution is centred around 60mm. These recommendations should also enable seed to be used efficiently, helping you save seed costs.

What about crop uniformity?

Uniform crop establishment and growth should reduce variability in size and quality of the harvested produce. In a less uniform crop there will be a greater proportion of very large (>85mm) and small (<40mm) tubers. Among other factors, planting precision, good soil preparation and pathogen/pest control will help uniformity and maintain tuber numbers and yield.

What other factors may influence seed rates?

It is recognised that factors other than those accounted for in this guide may affect the number of tubers and thus seed rates. Additional research is being carried out at CUF attempting to identify and quantify the important factors. Where appropriate the findings will lead to refined seed rate recommendations. At present these guides do not specify different seed rates for use of cut, physiologically-aged or chitted seed.

How to use the guide

Step One

Determine seed age

Your seed supplier should be able to give you this information. Ideally it is the period from emergence of the seed crop to planting of the current crop. If no information on seed emergence date is available, the date of herbicide application may be useful, but the date of planting is not a substitute.

Standard-aged seed will have emerged in early June – use the middle section of the table, shaded beige.

Recommended plant populations are lower for **early-emerged seed** – use the top table, unshaded.

Recommended plant populations are higher for **late-emerged seed** – use the bottom section of the table, shaded green.

In our example we are working with Early seed (top section of table).

Yield for an average tuber size of 60mm

	55 t/ha		60 t/ha		65 t/ha	
Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)
Early seed (emerged 1 May)						
200	42	0.88	48	1.00	54	1.13
300	39	0.99	45	1.12	51	1.27
400	36	1.13	41	1.28	46	1.45
500	32	1.32	36	1.50	41	1.69
600	29	1.44	33	1.63	37	1.85
700	27	1.51	31	1.71	35	1.94
800	25	1.58	29	1.80	33	2.04
900	23	1.67	27	1.89	30	2.14
1000	21	1.76	24	2.00	27	2.27
1100	19	1.86	21	2.12	24	2.40
1200	16	1.98	18	2.25	20	2.55
Standard seed (emerged 1 June)						
1300	15	2.07	17	2.33	19	2.46
1400	14	2.16	16	2.42	18	2.55
1500	13	2.25	15	2.51	17	2.64
1600	12	2.34	14	2.60	16	2.73
1700	11	2.43	13	2.69	15	2.82
1800	10	2.52	12	2.78	14	2.91
1900	9	2.61	11	2.87	13	3.00
2000	8	2.70	10	2.96	12	3.09

Step Two

Determine seed tuber count

Once you have chosen which section of the table you need to use, count the number of tubers in a 50kg sample of the seed. This will decide which row you will use to determine density and seed rate. Note that closely graded seed will produce a more uniform stem density in the subsequent crop. Consider split-grading highly variable seed and deal with each grade of seed separately. In our example we have a 2000 tuber count.

Tuber count / 50kg	Plant density (000/ha): Seed rate (t/ha)	Plant density (000/ha): Seed rate (t/ha)
2400	42	0.88
2000	39	0.99
1600	36	1.13
1200	32	1.32
1000	29	1.44
900	27	1.51
800	25	1.58
700	23	1.67
600	21	1.76

Step Three

Determine target yield and optimum tuber size

Experience, field history and other factors will determine target yield, while your target market may specify a different optimum average tuber size. Discuss with your customer or agronomist to agree target yields and value of different fractions. The table offers guidance on plant densities for a range of yields from 55 to 70t/ha, for an average tuber size of 60mm. Your target yield will determine which column you use. In our example we have a target yield of 60t/ha.

Yield (t/ha)	Plant density (000/ha)	Seed rate (t/ha)
42	0.88	48
39	0.99	45
36	1.13	41
32	1.32	36
29	1.44	33
27	1.51	31
25	1.58	29
23	1.67	27
21	1.76	24
19	1.86	21

Make a note of the seed rate, in this case 1.12t/ha, multiplying this by the number of hectares to be planted with this size seed will give you your total seed requirement.

Step Four

Calculate your within-row spacing

$$\frac{100,000}{45 \times 91.4} = 24.3$$

Step Five

Are these seed rates appropriate?

Areas shaded red indicate plant populations below 26,000 plants per hectare which are not generally recommended. Planting at a wide spacing can result in unacceptably gappy crops, particularly where planting is irregular or emergence is poor.

Seed rate guide for Maris Piper for specified yield with a target average tuber size of 60mm[†] and a planting date of 15 April

Yield (t/ha)								
	55 ‡		60		65		70	
Tuber count / 50kg	Plant density (000/ha)	Seed rate (t/ha)	Plant density (000/ha)	Seed rate (t/ha)	Plant density (000/ha)	Seed rate (t/ha)	Plant density (000/ha)	Seed rate (t/ha)
Early seed (emerged 1 May)								
2400	42	0.88	48	1.00	54	1.13	61	1.27
2000	39	0.99	45	1.12	51	1.27	57	1.43
1600	36	1.13	41	1.28	46	1.45	53	1.64
1200	32	1.32	36	1.50	41	1.69	46	1.92
1000	29	1.44	33	1.63	37	1.85	42	2.09
900	27	1.51	31	1.71	35	1.94	39	2.19
800	25	1.58	29	1.80	33	2.04	37	2.30
700	23	1.67	27	1.89	30	2.14	34	2.43
600	21	1.76	24	2.00	27	2.27	31	2.56
500	19	1.86	21	2.12	24	2.40	27	2.71
400	16	1.98	18	2.25	20	2.55	23	2.88
Standard seed (emerged 1 June)								
2400	49	1.02	56	1.16	63	1.32	71	1.49
2000	46	1.15	52	1.30	59	1.48	67	1.67
1600	42	1.30	47	1.48	54	1.68	61	1.90
1200	36	1.51	41	1.72	47	1.95	53	2.20
1000	33	1.65	37	1.87	42	2.12	48	2.40
900	31	1.72	35	1.96	40	2.22	45	2.51
800	29	1.80	33	2.05	37	2.32	42	2.63
700	27	1.89	30	2.15	34	2.44	39	2.76
600	24	1.99	27	2.27	31	2.57	35	2.90
500	21	2.11	24	2.39	27	2.71	31	3.07
400	18	2.23	20	2.54	23	2.87	26	3.25
Late seed (emerged 15 July)								
2400	64	1.34	73	1.52	83	1.72	94	1.95
2000	60	1.49	68	1.69	77	1.92	87	2.17
1600	54	1.68	61	1.91	69	2.16	78	2.45
1200	46	1.92	53	2.19	59	2.48	67	2.80
1000	42	2.08	47	2.36	53	2.67	60	3.02
900	39	2.16	44	2.46	50	2.78	57	3.15
800	36	2.25	41	2.56	46	2.90	52	3.28
700	33	2.35	37	2.67	42	3.03	48	3.43
600	30	2.46	34	2.80	38	3.17	43	3.59
500	26	2.58	29	2.94	33	3.33	38	3.76
400	22	2.71	25	3.09	28	3.50	32	3.95

[†]Average tuber size is the grade with the greatest proportion of yield. Assuming a coefficient of variation of 0.20, c. 50% of yield is 60-85mm where the average tuber size is 60mm. Yields indicated are the total tuber yields rather than marketable yields above a minimum size (where the average tuber size = 60mm, c. 5% of yield may be expected to be below 40mm).

[‡]Where yields >55t/ha are expected, seed rates shown in this column can be used but the average tuber size will be greater, increasing to 65mm at a yield of 70t/ha. The proportion of yield in the 60-85mm grade may be c. 60% where the tuber size average = 65mm, but a significant proportion of tubers may be >85mm. For red shaded area see Step Five in main text.

Using the new seed rates

Growers are encouraged to try the new seed rates on their own soil type and conditions by planting a few rows in the first year so that the new rates can be compared to standard practice.

Where seed age, planting date and target tuber size do not match the examples, some interpolation is required. For seed age, the crucial factor is the interval between emergence of the seed crop and planting of the subsequent crop. For example, for Standard seed, where planting dates are substantially later than 15 April the chronological age of the seed may be regarded as falling into the Early seed category, however there may be confounding effects (notably that of soil temperature).

Further information

There are a range of research reports, available to levy payers, on the Potato Council website providing additional information on factors affecting marketable yield (www.potato.org.uk/publications). These include:

Factors affecting tuber numbers per stem leading to improved seed rate recommendations. DM Firman. 2008

Production practices, storage and sprouting conditions affecting number of stems per seed tuber and the grading of potato crops - (Report No.2004/14). DM Firman, EJ Allen & VJ Shearman. 2004

Evaluation of an N management and yield prediction model by Cambridge University Farm: MF Allison, EJ Allen, DM Firman, MA Stalham. 2008

While every effort has been made to ensure that the information is accurate, no liability can be accepted for any error or omission in the content of this guide.



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