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Summer Maize 2024-5 ART Variety Trial Report

Season	**2024-2025**
Crop	**Maize**
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Date	Friday, July 18, 2025

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1 Introduction

Choosing the right crop variety is one of the most fundamental and important agronomic considerations in crop production. It can significantly impact characteristics including days to maturity, pest and disease damage, lodging, and ultimately, yield. The choice of cultivar subsequently has a great effect on the bottom line of the producer. Seed houses and producers alike must therefore carefully consider a range of conditions in selecting the right cultivar. These include agro-ecological zone, soil type and pH, fertilisation capacity, pest and disease control capacity, harvest time requirements, irrigation capacity, and intended use. Selecting the right cultivar is a difficult procedure. The use of scientific research is a highly important tool for producers and seed houses alike in order to make a reliable choice or recommendation. Further, when releasing new varieties to the market, seed houses may independently test the experimental cultivars against a series of industry standard commercial cultivars or ‘Checks’. This is to ensure from an scientific and unbiased perspective that the experimental cultivar provides additional value to the market. In addition, it protects producers from misinformation about cultivar performance. The objective of the ART Variety trials is to compare the performance of commercial and experimental grain crop cultivars in Winter and Summer seasons.

2 Site Management

This summer, 15 commercial and 5 communal sites were used, shown in figure (2.1). All sites were tilled to a level where there was less than 10% residue on the soil surface. Fertilisation rates, irrigation, and rainfall are detailed in table 2.1. The N-P-K ratio of each cereal blend was variable, but differed only by a maximum of 2% for each nutrient. Top dressing was done by hand at various rates depending on farmer management. Trials were kept weed-free throughout using a combination of herbicide and hand weeding. Irrigation relied on the management of the host farm, and consequently the total amount and distribution varied greatly with farmer preference, soil hydrological characteristics, water supply, and electricity supply.

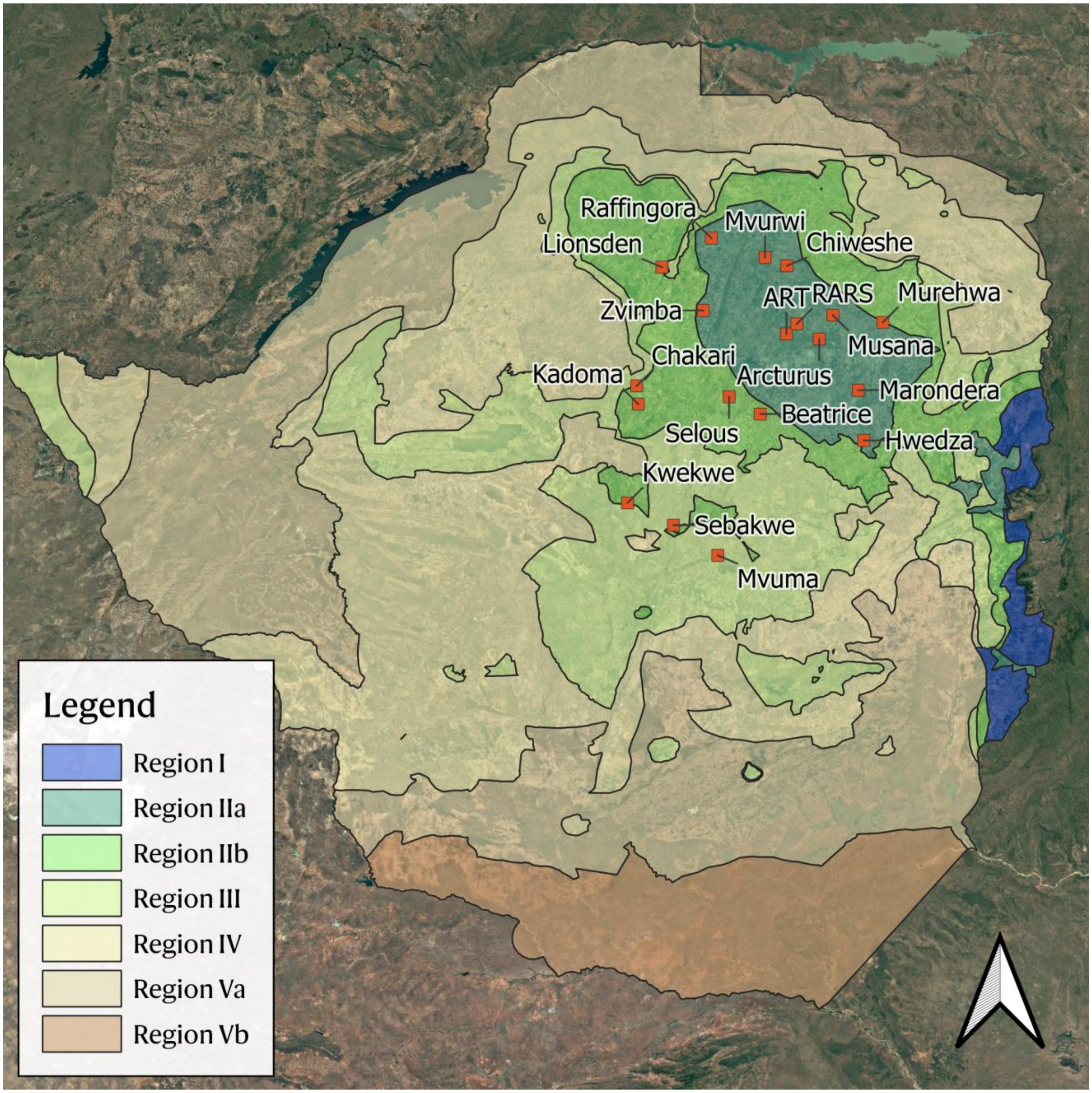


Figure 2.1: Map of all sites used in the trial and their position within the agro-ecological zones in Zimbabwe.

Table 2.1: List of Sites, trial management, and rainfall

Site	Planting date	Total rainfall	Irrigation	Previous Crop	N	P_2O_5	K_2O
ARCTURUS	2024-12-07	851.0	0	wheat	179.0	69	69
ART	2024-11-19	798.5	154	wheat	259.5	72	72
BEATRICE	2024-11-22	396.9	0	potato	156.0	69	69
CHAKARI	2024-12-06	467.0	88	wheat	179.0	69	69
CHIWESHE	2025-01-18	522.0	0	maize	179.0	69	69
HWEDZA	2024-12-09	662.0	0	tobacco	179.0	69	69
KADOMA	2024-12-31	635.5	0	0	166.0	56	56
KWEKWE	2024-11-28	598.0	60	wheat	179.0	69	69
LIONSDEN	2024-12-04	622.0	20	soya beans	179.0	69	69
MARONDERA	2024-12-10	850.5	0	maize	213.5	69	69
MUREHWA	2024-11-21	143.0	0	fallow	156.0	69	69
MUSANA	2024-11-21	852.5	0	maize	225.0	69	69
MVUMA	2024-11-26	480.0	186	sunflower	179.0	69	69
RAFFINGORA	2024-12-03	566.0	0	onions	225.0	69	69
RARS	2024-11-23	0.0	0	0	225.0	69	69
SEBAKWE	2024-11-27	648.5	125	wheat	294.0	69	69
SELOUS	2024-11-29	348.0	0	cabbage	202.0	69	69
SHAMVA	2024-02-19	0.0	0	soyabeans	259.5	69	69
ZVIMBA	2024-11-22	877.0	0	maize	179.0	69	69

3 Results and Discussion

Results of the variety trial are presented for released cultivars across all sites. Site-specific results for all varieties tested, including experimental varieties, can be downloaded in excel format from our website.

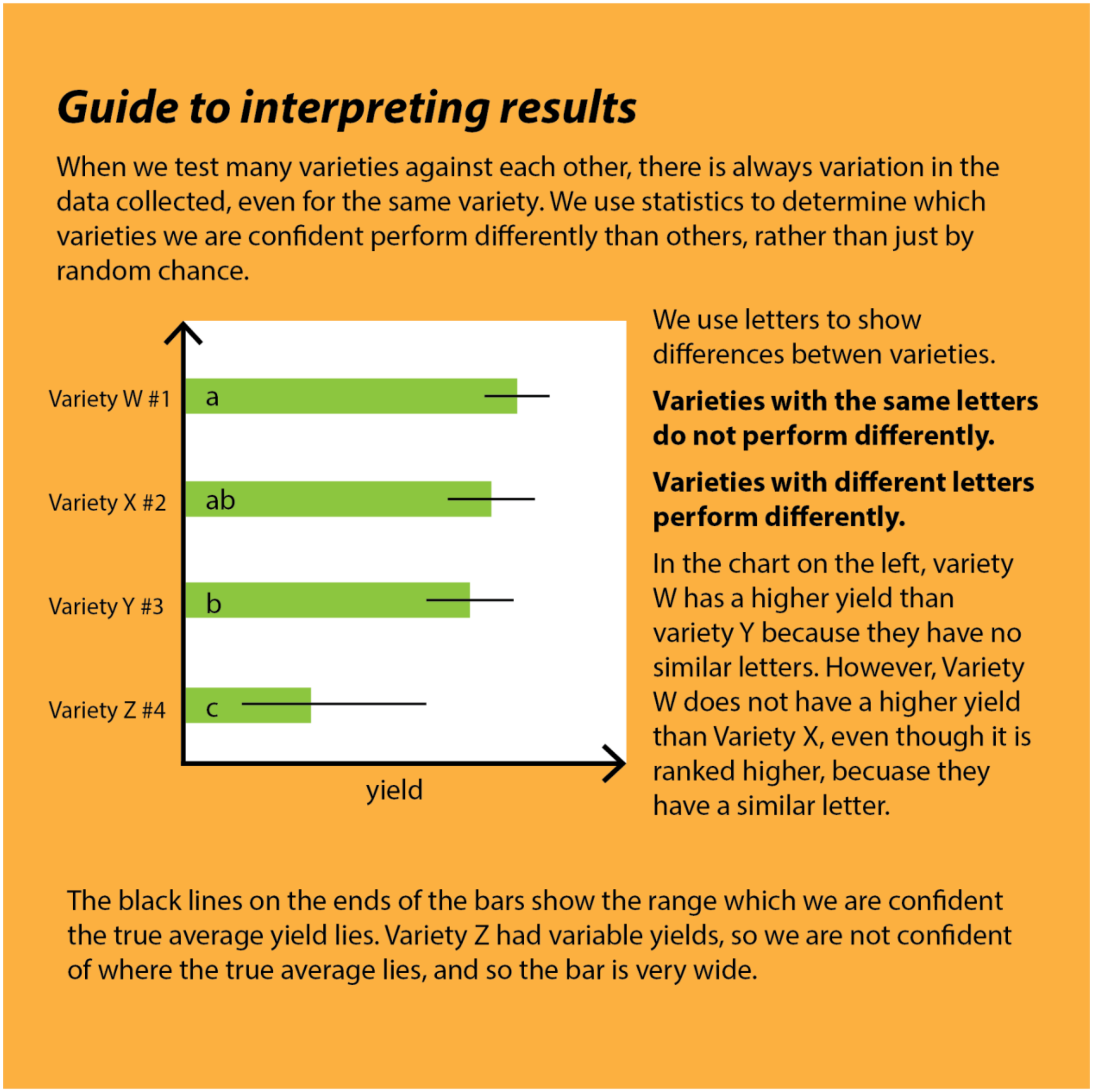


Figure 3.1: Guide to interpreting results

3.1 Maturity

It is critical that a maize crop reaches at least physiological maturity before the end of the rainy period in rainfed areas. Figure 3.2 displays a chart of the days to maturity of the varieties tested in this seasons trials. This trait can vary wdiely based on environmental conditions, so it is recommended to check the days to maturity for site with similar agro-ecological conditions.

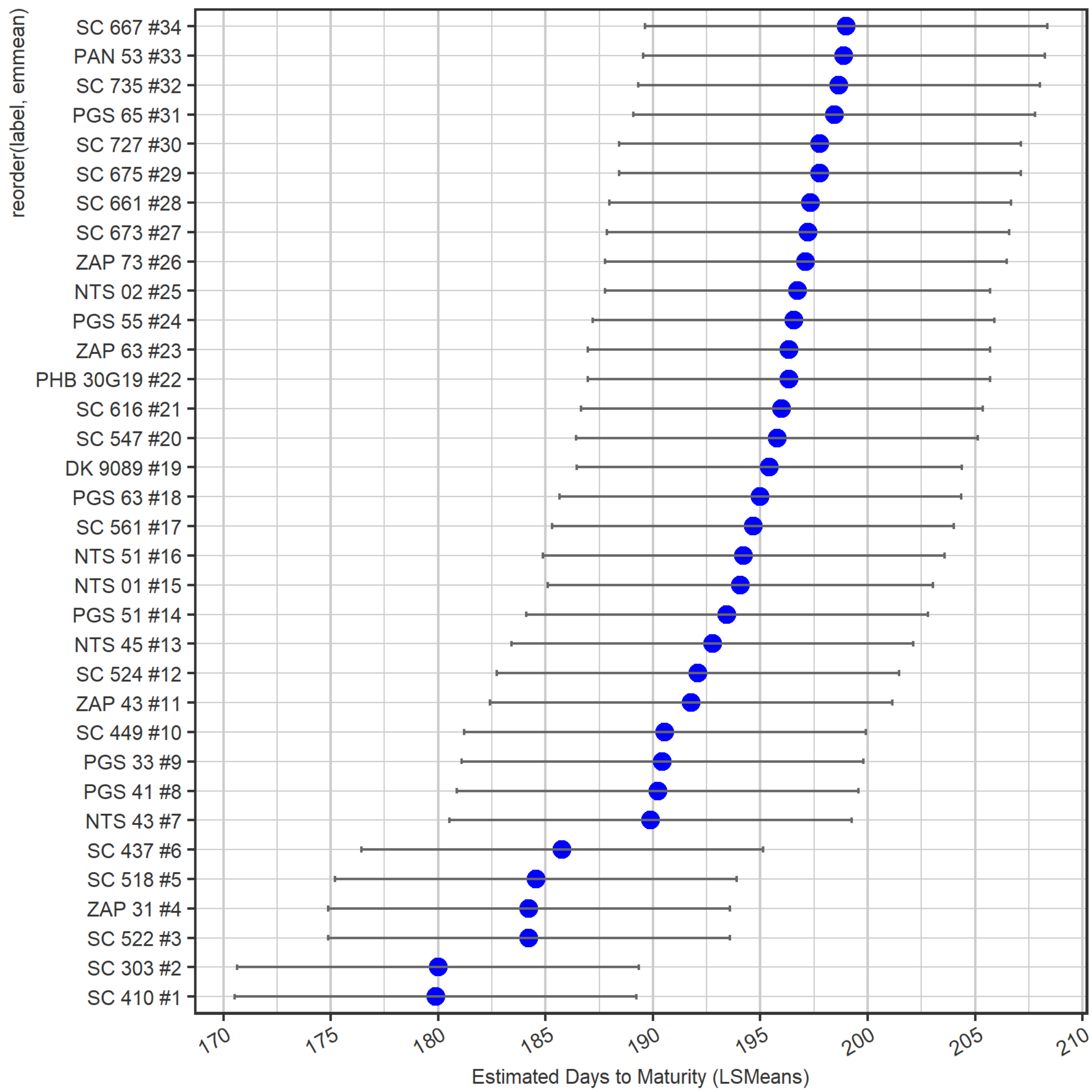


Figure 3.2: Days to 50% maturity. Error bars represent confidence intervals for adjusted means

3.2 Diseases

There are several diseases of Maize in Zimbabwe which are which can cause economically significant impacts but a farmer does not expect to control for. Instead, resistance to these diseases are typically bred into crop varieties. Rust (*Puccinia spp.*), Northern Leaf Blight (*Exserohilium turcicum*), Grey Leaf spot (*Cercospora zeae-maydis*), Maize Streak Virus (*Mastrevirus spp.*), and number of diseased cobs were assessed. Records were taken at sites RARS, ART, and Kadoma.

3.2.1 Foliar Diseases

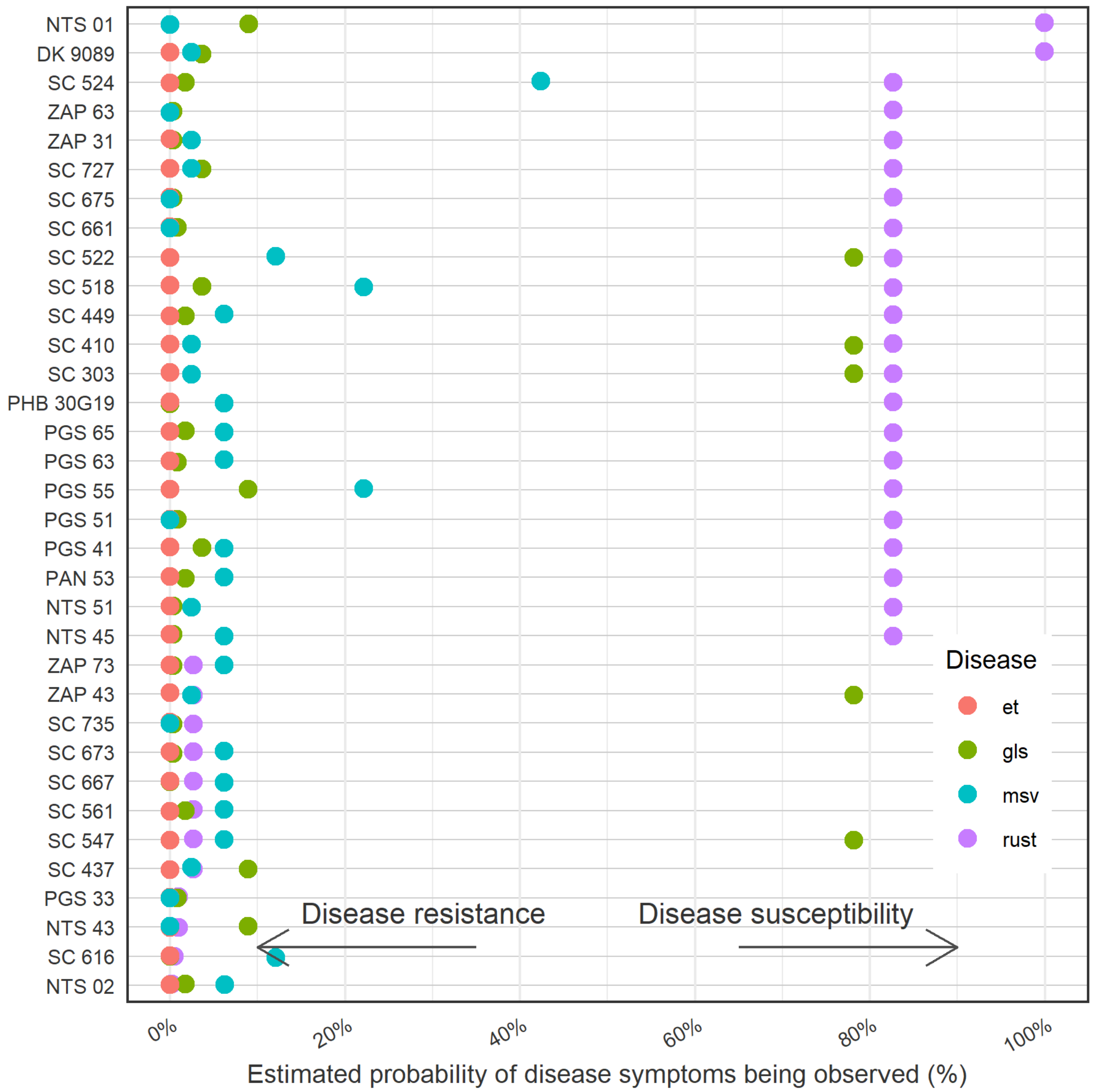


Figure 3.3: Estimated probabiltiies of at least some disease symtoms being observed. Varieties are ordered by Rust scores.

3.2.2 Diseased cobs

Figure 3.4 shows that there was no significant differences between varieties on the proportion of diseased cobs.

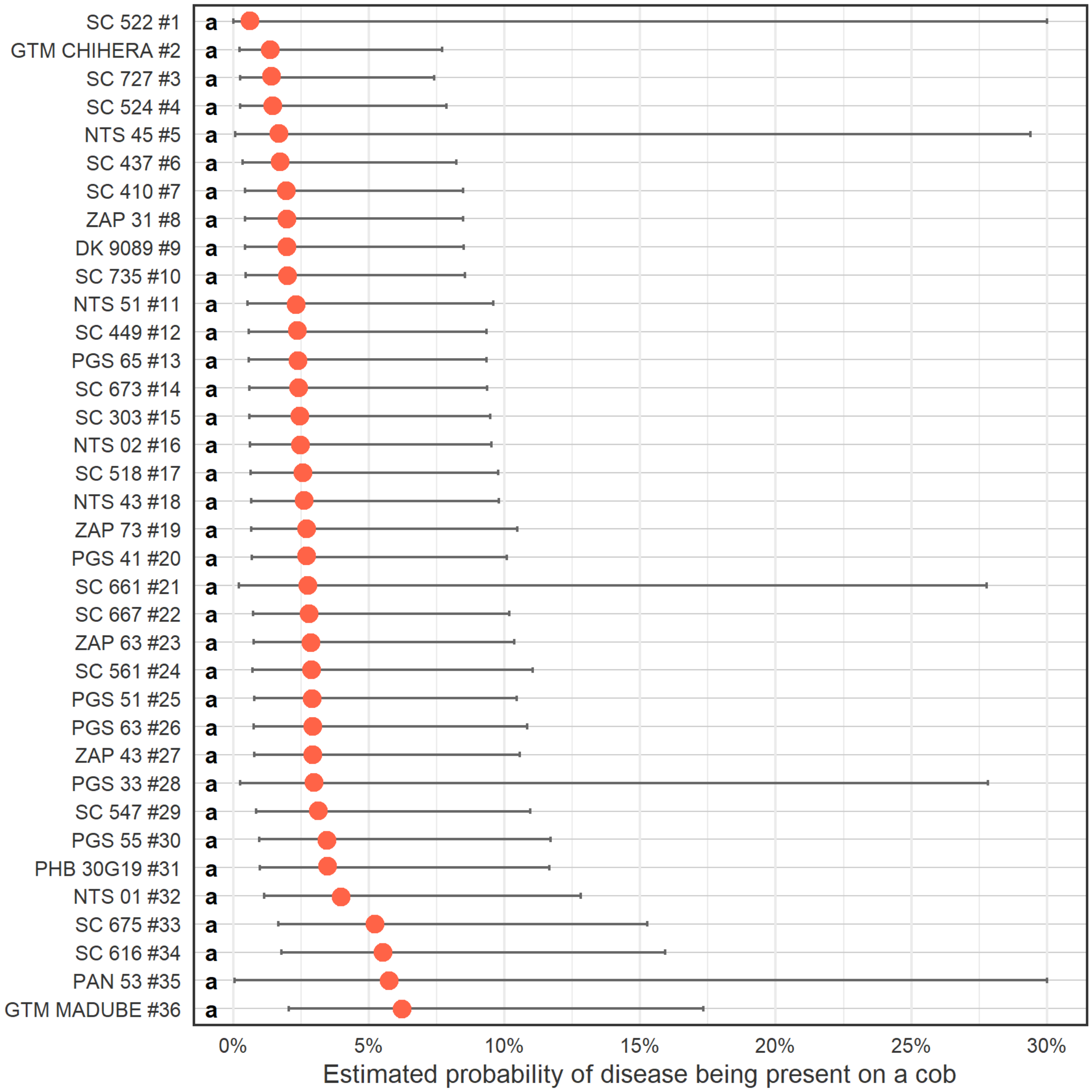


Figure 3.4: Percentage of cobs with disease present. lines represent confidence intervals.

3.3 Lodging

Figure 3.5 shows that there are no statistical differences in lodging. This means the pattern we see is most likely due to random chance and not due to variety.

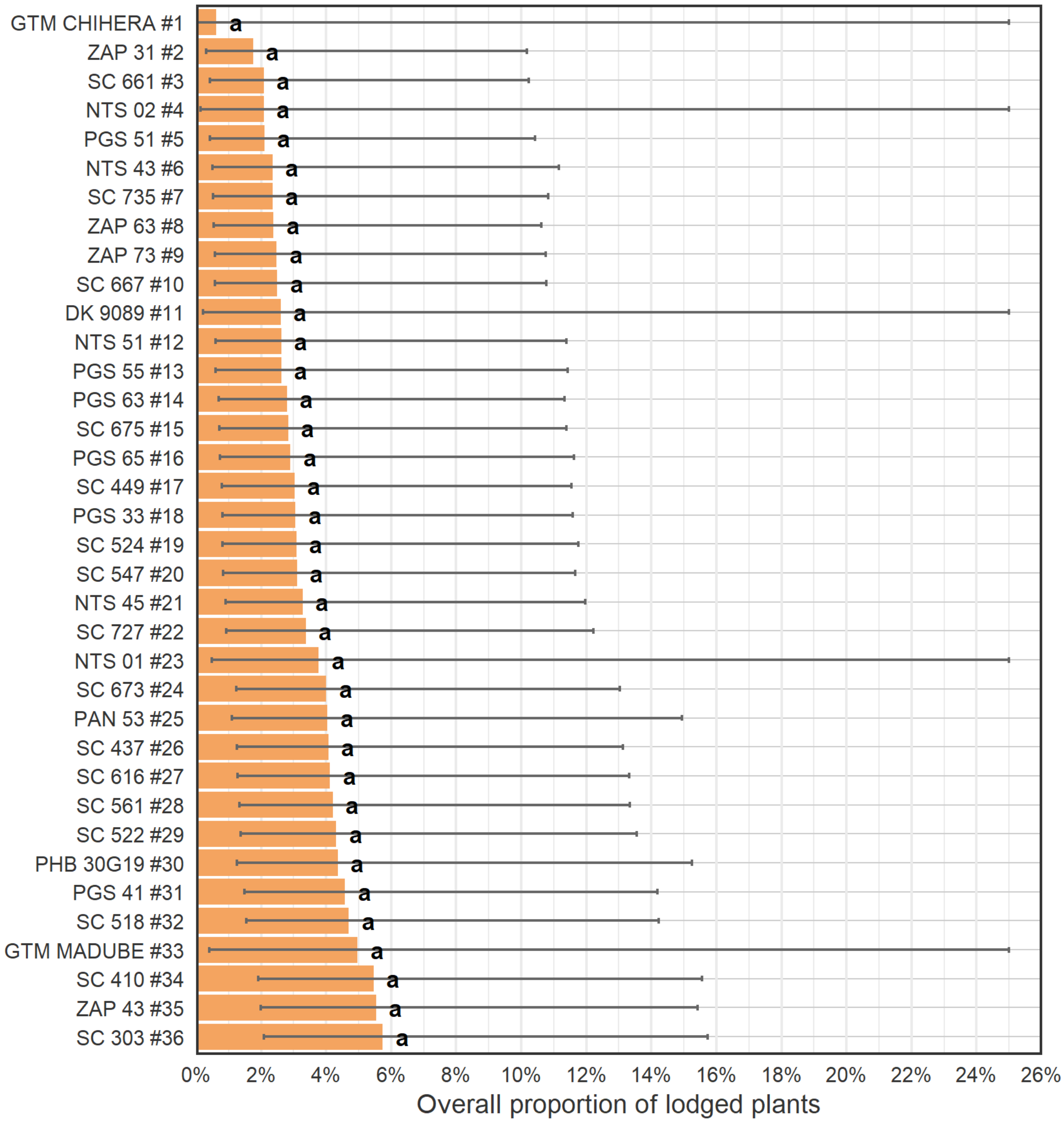


Figure 3.5: Lodging percentage across all sites, separated by stalk and root lodging

3.4 Cob height

Cob height is important to be high for combining, but cobs too high on the plant can cause lodging. Figure 3.6 shows average cob heights. In these trials, there were no cob heights which were outside the optimum range.

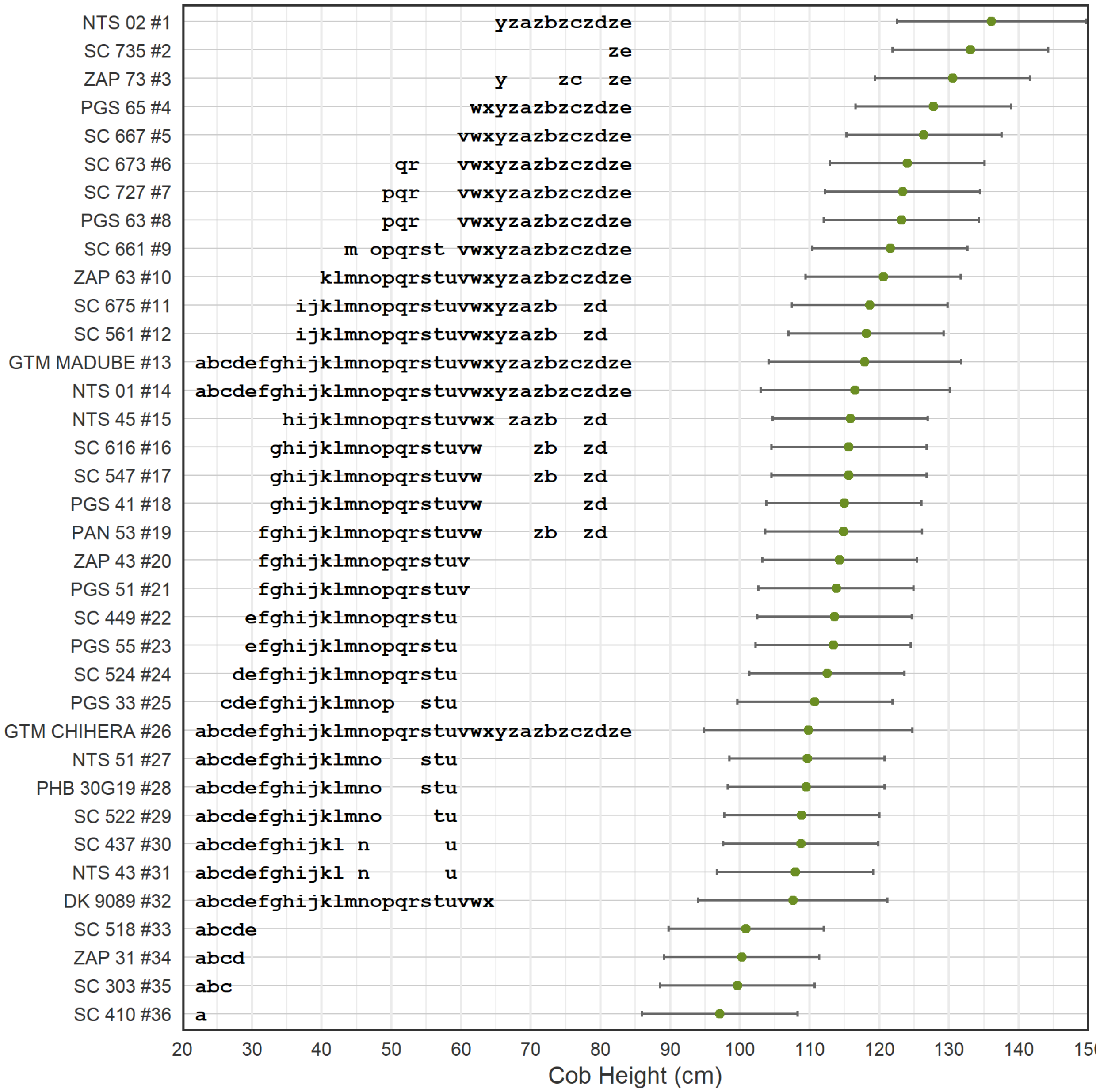


Figure 3.6: Average cob heights across varieties. Letters not shown in this figure to to overcomplexity. Lines represent confidence intervals and can be used to heuristically derermine differences between varieties.

3.5 Moisture at Harvest

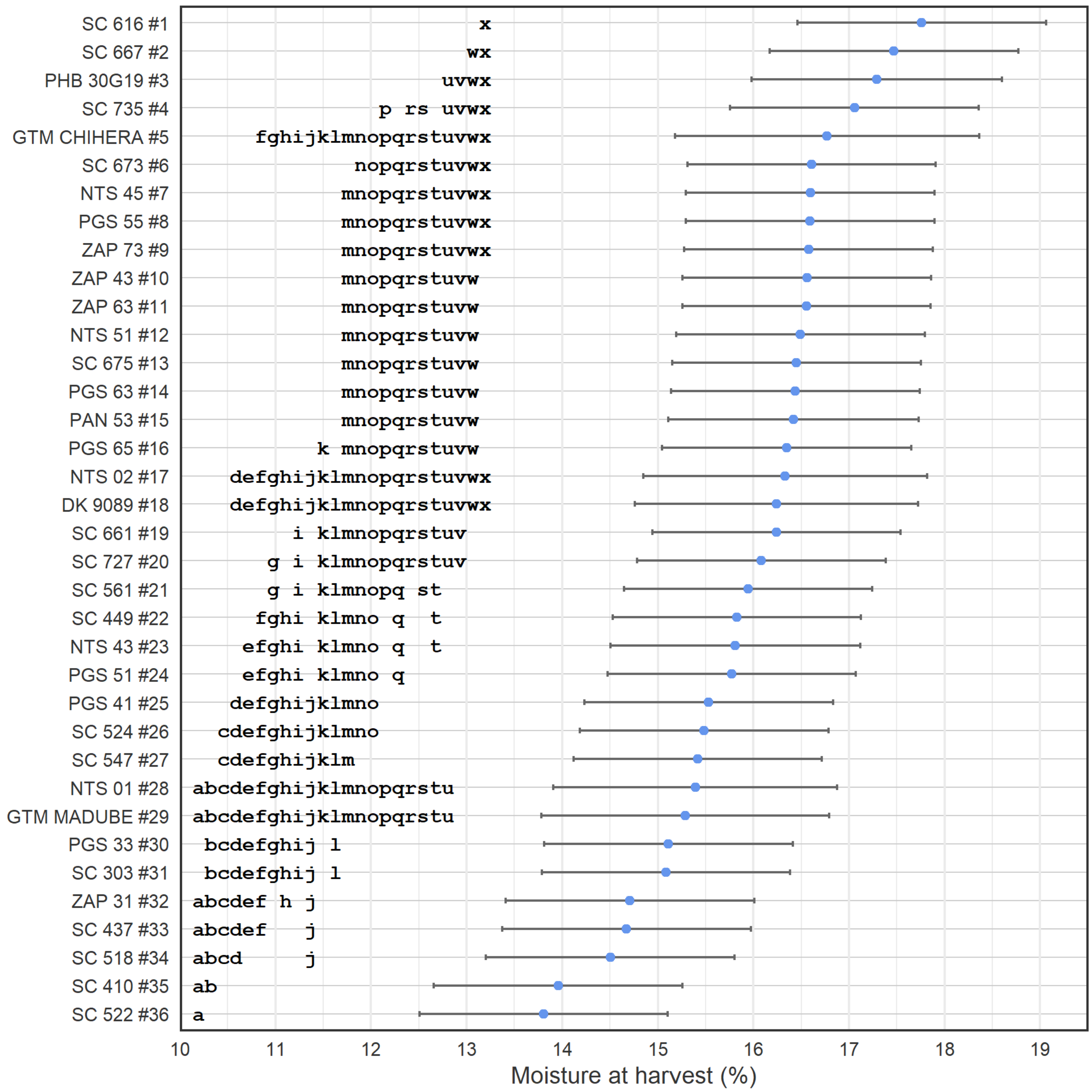


Figure 3.7: Percentage moisture at harvest

3.6 Yield

3.6.1 Average yields

Yield is the most important agronomic trait crop can have, and variety significantly affects yield. Figure 3.8 shows the average yields at each site. Figure 3.9 displays average yields per variety.

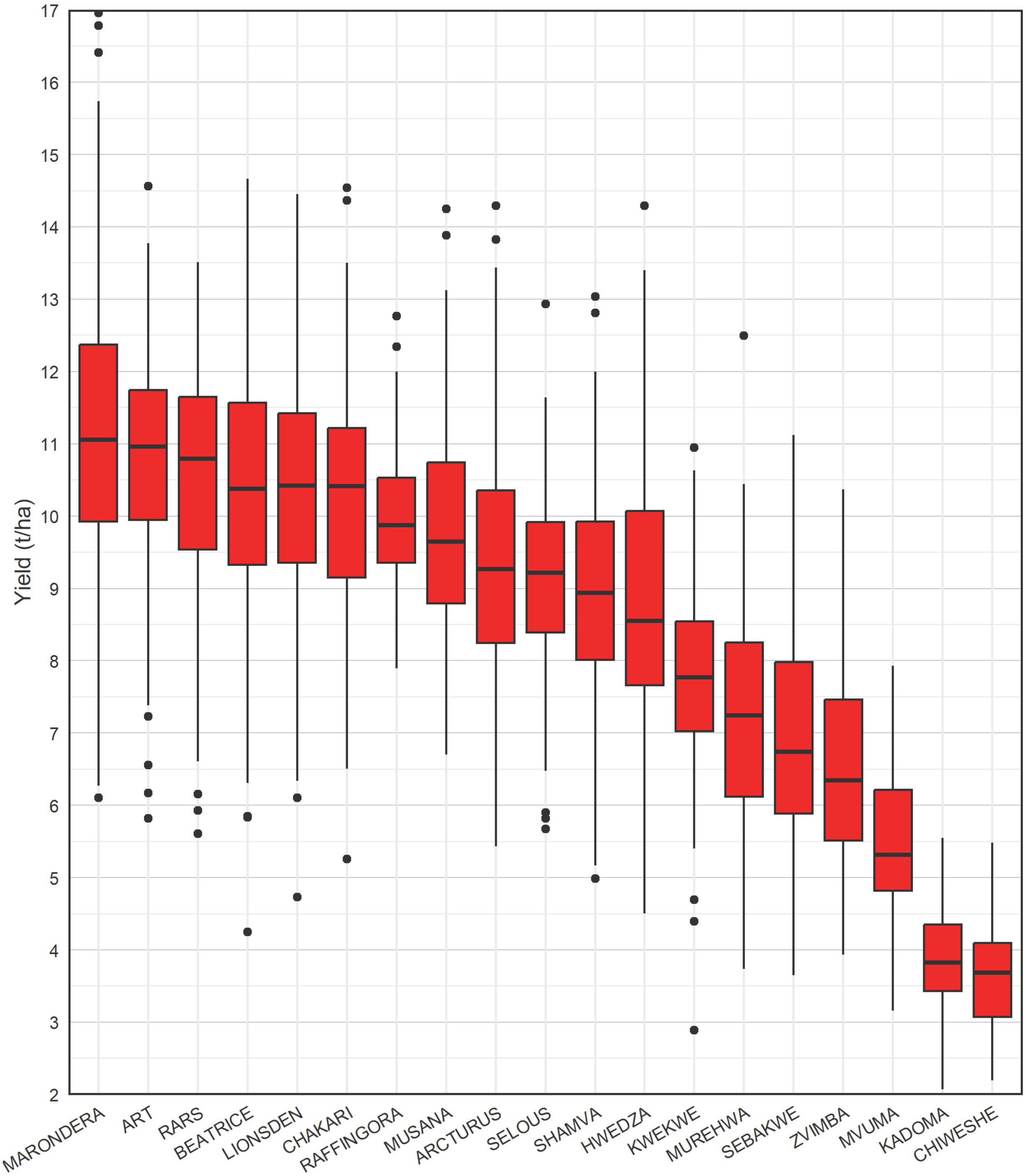


Figure 3.8: Grain yield averages per site. Lines in boxes = average yields, Boxes = interquartile range (where 50% of the data lies), and lines represent total range. Dots represent potential outliers.

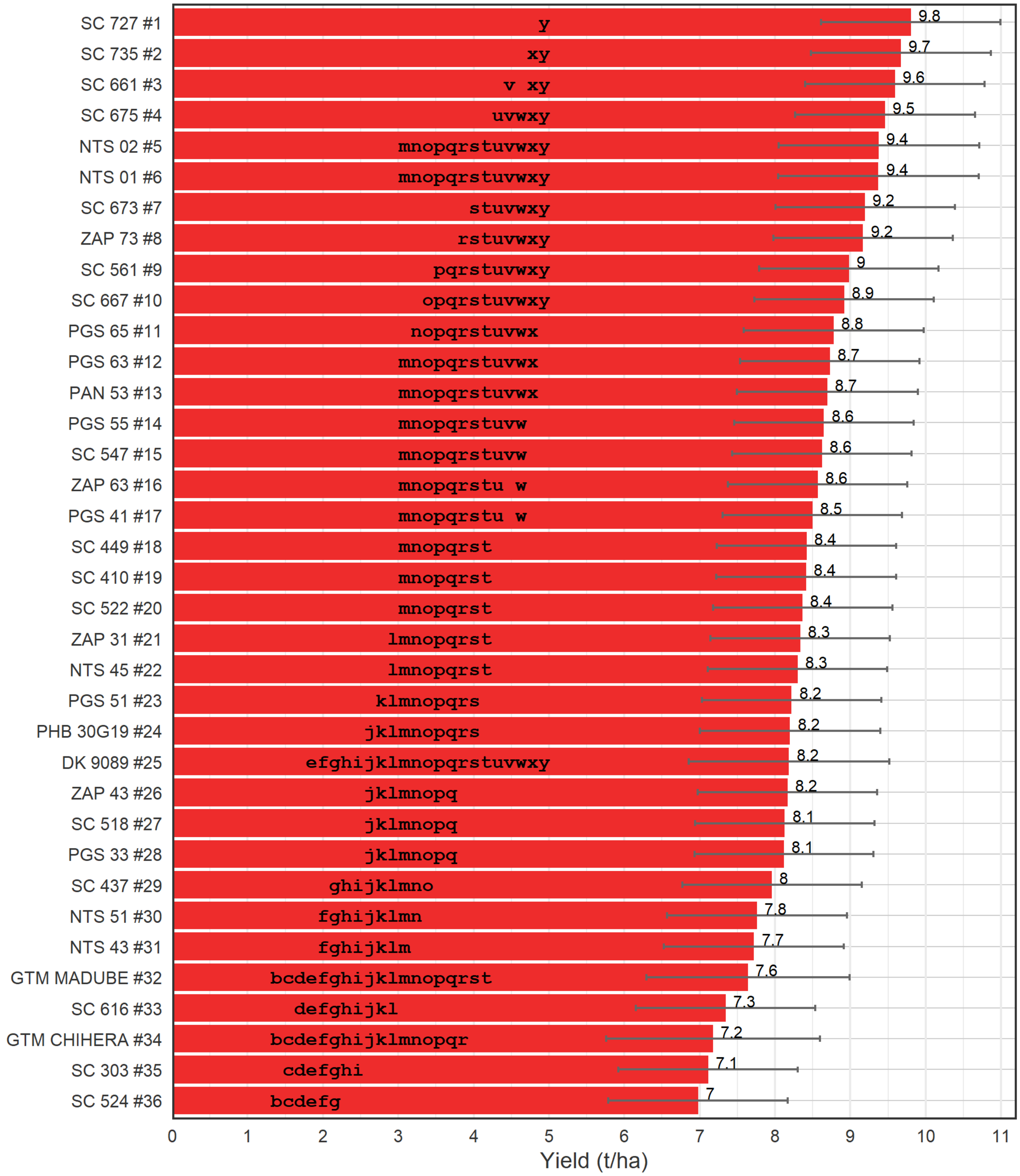
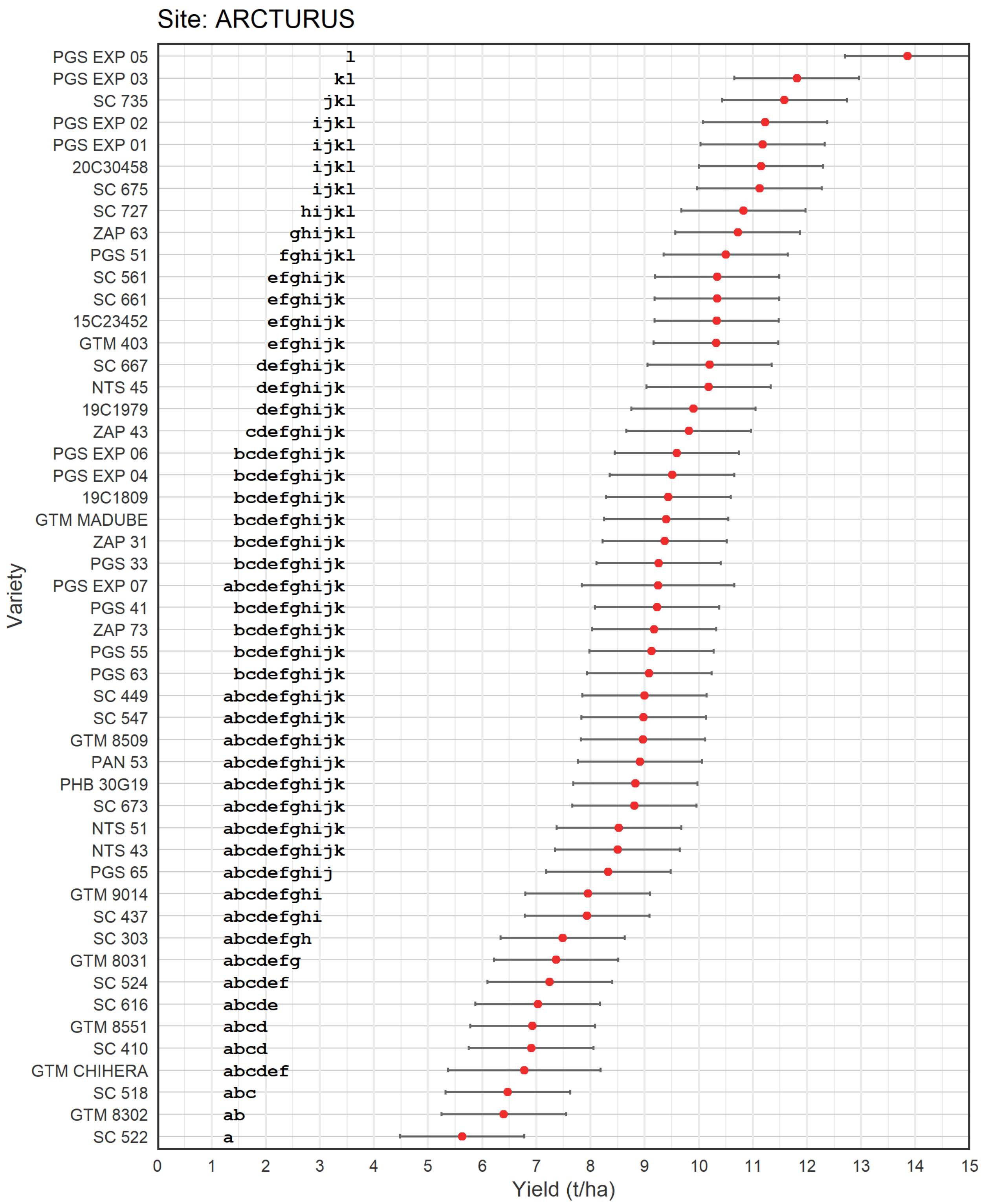
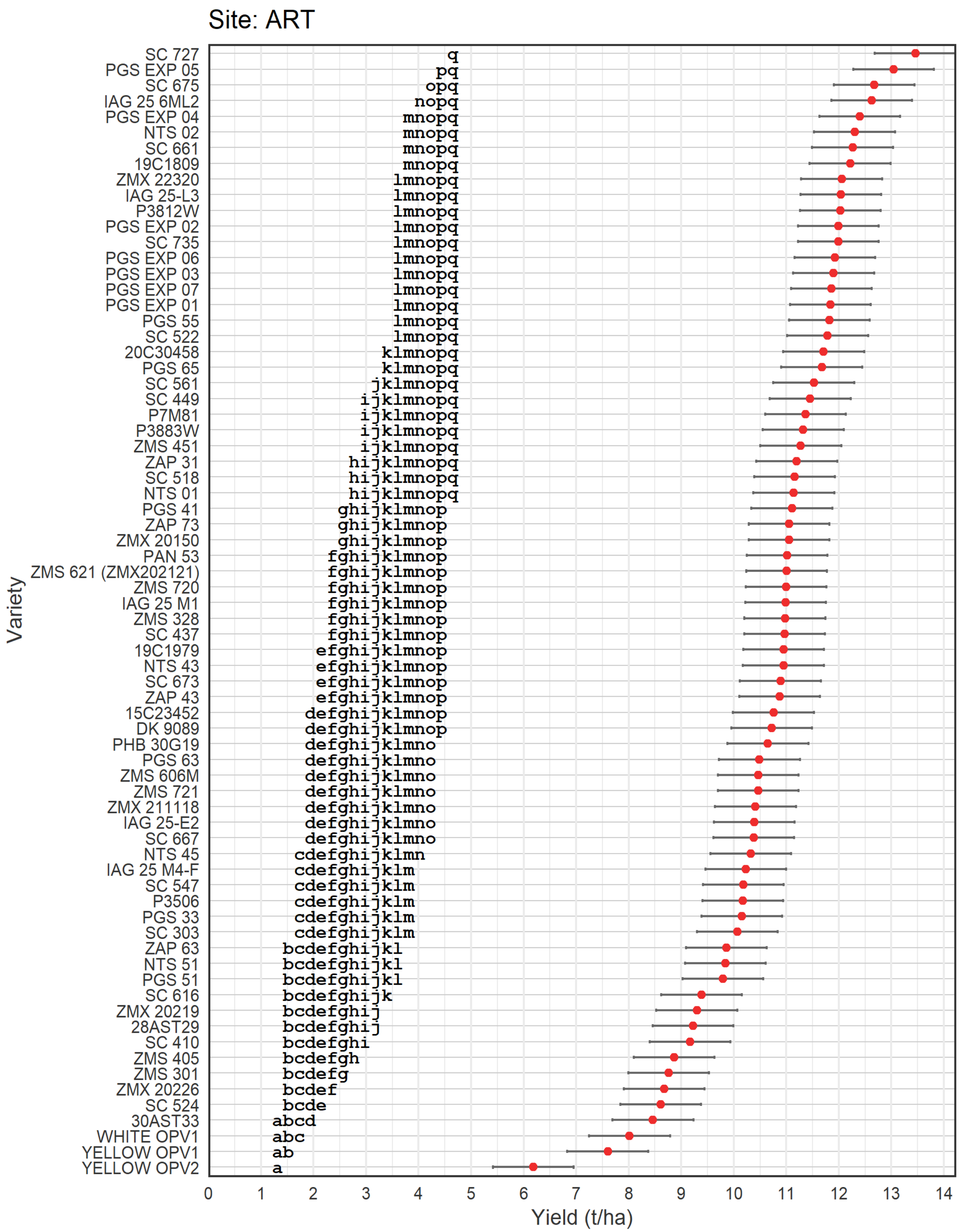


Figure 3.9: Grain yield per site (continued onto subsequent pages)



Site: ARCTURUS
PGS EXP 05 l
PGS EXP 03 kl
SC 735 jkl
PGS EXP 02 ijkl
PGS EXP 01 ijkl
20C30458 ijkl
SC 675 ijkl
SC 727 hijkl
ZAP 63 ghijkl
PGS 51 fghijkl
SC 561 efghijk
SC 661 efghijk
15C23452 efghijk
GTM 403 efghijk
SC 667 defghijk
NTS 45 defghijk
19C1979 defghijk
ZAP 43 cdefghijk
PGS EXP 06 bcdefghijk
PGS EXP 04 bcdefghijk
19C1809 bcdefghijk
GTM MADUBE bcdefghijk
ZAP 31 bcdefghijk
PGS 33 bcdefghijk
PGS EXP 07 abcdefghijk
PGS 41 bcdefghijk
ZAP 73 bcdefghijk
PGS 55 bcdefghijk
PGS 63 bcdefghijk
SC 449 abcdefghijk
SC 547 abcdefghijk
GTM 8509 abcdefghijk
PAN 53 abcdefghijk
PHB 30G19 abcdefghijk
SC 673 abcdefghijk
NTS 51 abcdefghijk
NTS 43 abcdefghijk
PGS 65 abcdefghij
GTM 9014 abcdefghi
SC 437 abcdefghi
SC 303 abcdefgh
GTM 8031 abcdefg
SC 524 abcdef
SC 616 abcde
GTM 8551 abcd
SC 410 abcd
GTM CHIHERA abcdef
SC 518 abc
GTM 8302 ab
SC 522 a
Variety
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
Yield (t/ha)



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Variety
Yield (t/ha)
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SC 675 opq
IAG 25 6ML2 nopq
PGS EXP 04 mnopq
NTS 02 mnopq
SC 661 mnopq
19C1809 mnopq
ZMX 22320 lmnopq
IAG 25-L3 lmnopq
P3812W lmnopq
PGS EXP 02 lmnopq
SC 735 lmnopq
PGS EXP 06 lmnopq
PGS EXP 03 lmnopq
PGS EXP 07 lmnopq
PGS EXP 01 lmnopq
PGS 55 lmnopq
SC 522 lmnopq
20C30458 klmnopq
PGS 65 klmnopq
SC 561 jklmnopq
SC 449 ijklmnopq
P7M81 ijklmnopq
P3883W ijklmnopq
ZMS 451 ijklmnopq
ZAP 31 hijklmnopq
SC 518 hijklmnopq
NTS 01 hijklmnopq
PGS 41 ghijklmnop
ZAP 73 ghijklmnop
ZMX 20150 ghijklmnop
PAN 53 fghijklmnop
ZMS 621 (ZMX202121) fghijklmnop
ZMS 720 fghijklmnop
IAG 25 M1 fghijklmnop
ZMS 328 fghijklmnop
SC 437 fghijklmnop
19C1979 efghijklmnop
NTS 43 efghijklmnop
SC 673 efghijklmnop
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DK 9089 defghijklmnop
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IAG 25 M4-F cdefghijklm
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SC 303 cdefghijklm
ZAP 63 bcdefghijkl
NTS 51 bcdefghijkl
PGS 51 bcdefghijkl
SC 616 bcdefghijk
ZMX 20219 bcdefghij
28AST29 bcdefghij
SC 410 bcdefghi
ZMS 405 bcdefgh
ZMS 301 bcdefg
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30AST33 abcd
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YELLOW OPV1 ab
YELLOW OPV2 a
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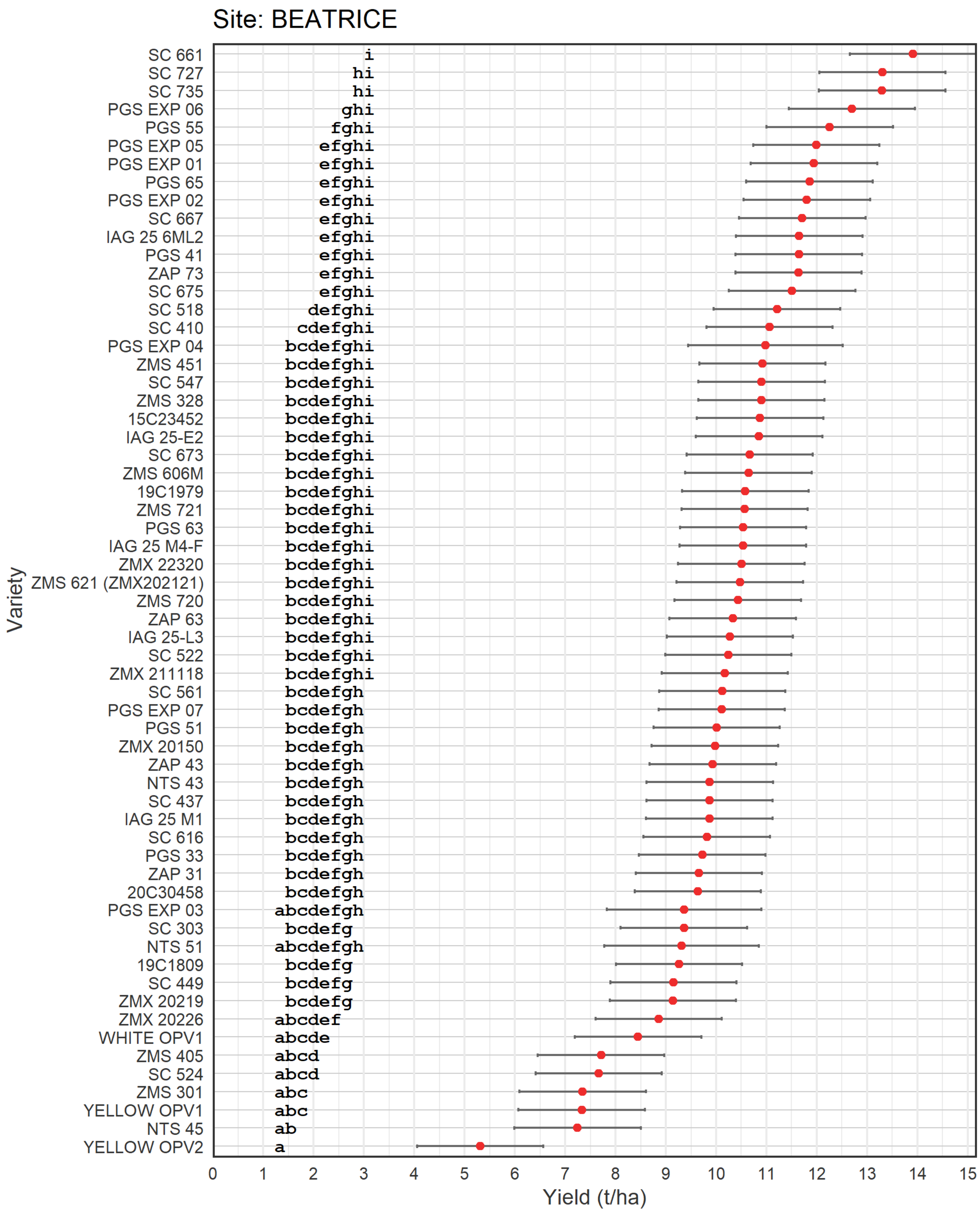
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Variety
Yield (t/ha)
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SC 727 hi
SC 735 hi
PGS EXP 06 ghi
PGS 55 fghi
PGS EXP 05 efghi
PGS EXP 01 efghi
PGS 65 efghi
PGS EXP 02 efghi
SC 667 efghi
IAG 25 6ML2 efghi
PGS 41 efghi
ZAP 73 efghi
SC 675 efghi
SC 518 defghi
SC 410 cdefghi
PGS EXP 04 bcdefghi
ZMS 451 bcdefghi
SC 547 bcdefghi
ZMS 328 bcdefghi
15C23452 bcdefghi
IAG 25-E2 bcdefghi
SC 673 bcdefghi
ZMS 606M bcdefghi
19C1979 bcdefghi
ZMS 721 bcdefghi
PGS 63 bcdefghi
IAG 25 M4-F bcdefghi
ZMX 22320 bcdefghi
ZMS 621 (ZMX202121) bcdefghi
ZMS 720 bcdefghi
ZAP 63 bcdefghi
IAG 25-L3 bcdefghi
SC 522 bcdefghi
ZMX 211118 bcdefghi
SC 561 bcdefgh
PGS EXP 07 bcdefgh
PGS 51 bcdefgh
ZMX 20150 bcdefgh
ZAP 43 bcdefgh
NTS 43 bcdefgh
SC 437 bcdefgh
IAG 25 M1 bcdefgh
SC 616 bcdefgh
PGS 33 bcdefgh
ZAP 31 bcdefgh
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PGS EXP 03 abcdefgh
SC 303 bcdefg
NTS 51 abcdefgh
19C1809 bcdefg
SC 449 bcdefg
ZMX 20219 bcdefg
ZMX 20226 abcdef
WHITE OPV1 abcde
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YELLOW OPV2 a
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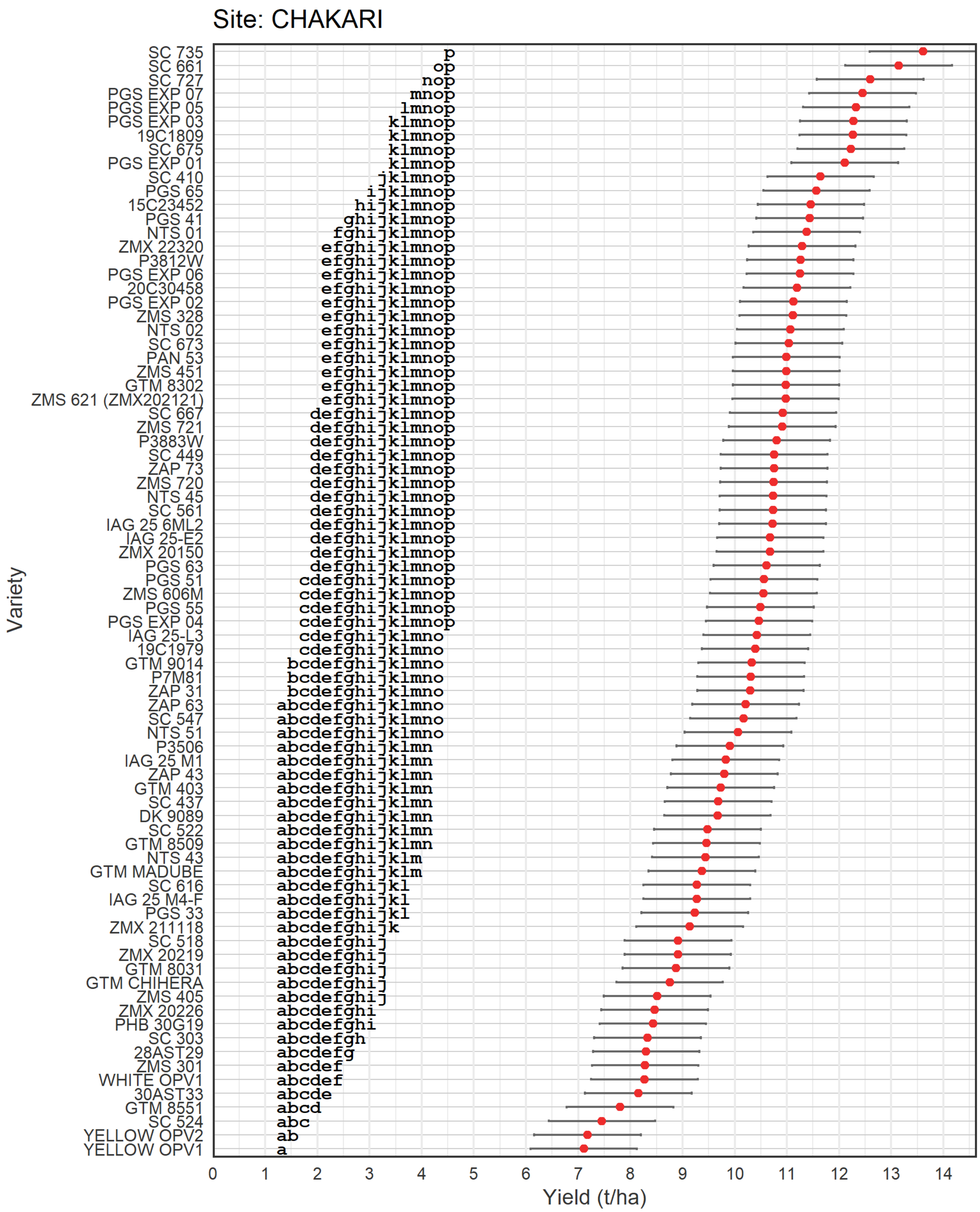

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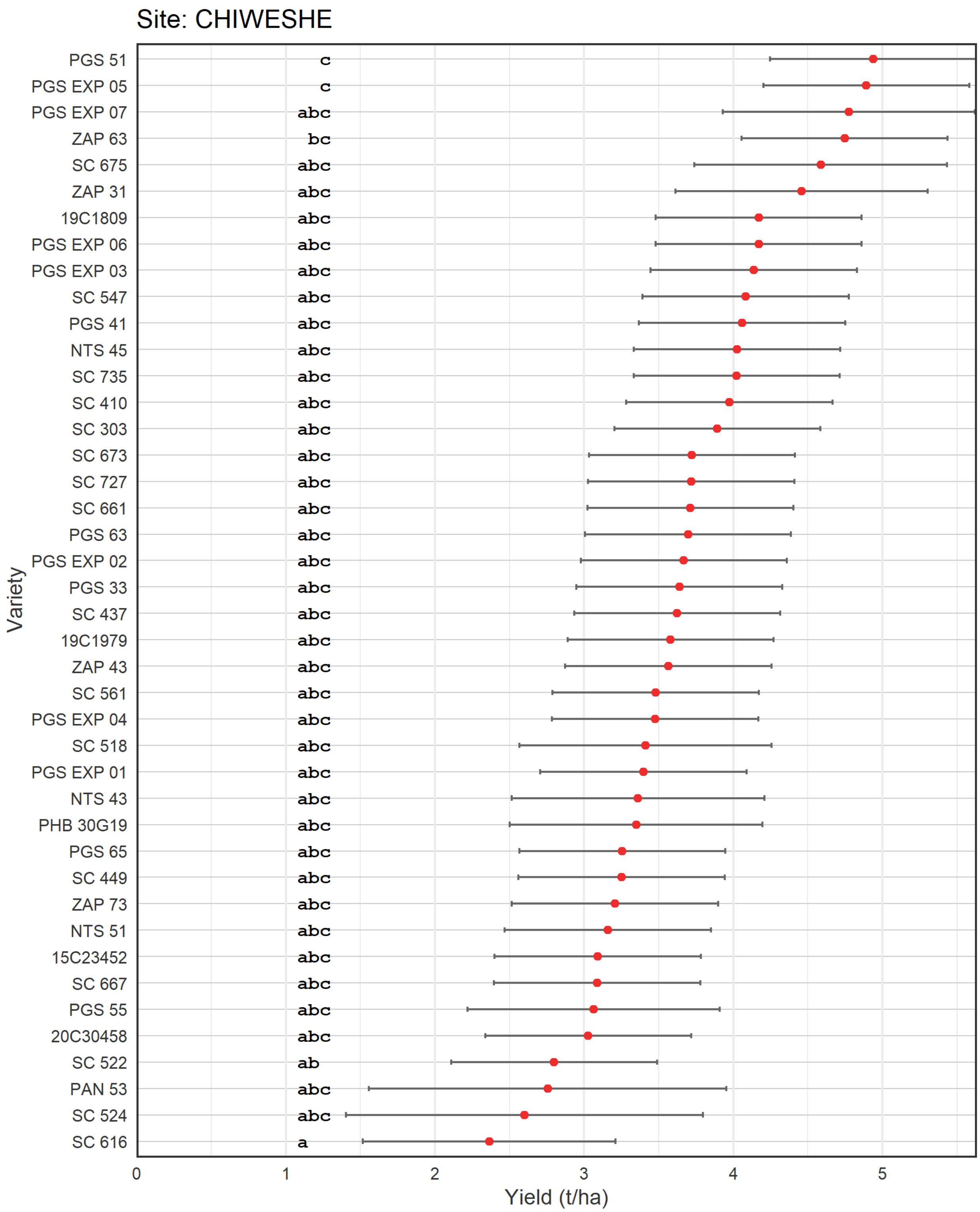
Variety
Yield (t/ha)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Variety
Yield (t/ha)
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PGS EXP 06 abc
PGS EXP 03 abc
SC 547 abc
PGS 41 abc
NTS 45 abc
SC 735 abc
SC 410 abc
SC 303 abc
SC 673 abc
SC 727 abc
SC 661 abc
PGS 63 abc
PGS EXP 02 abc
PGS 33 abc
SC 437 abc
19C1979 abc
ZAP 43 abc
SC 561 abc
PGS EXP 04 abc
SC 518 abc
PGS EXP 01 abc
NTS 43 abc
PHB 30G19 abc
PGS 65 abc
SC 449 abc
ZAP 73 abc
NTS 51 abc
15C23452 abc
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2
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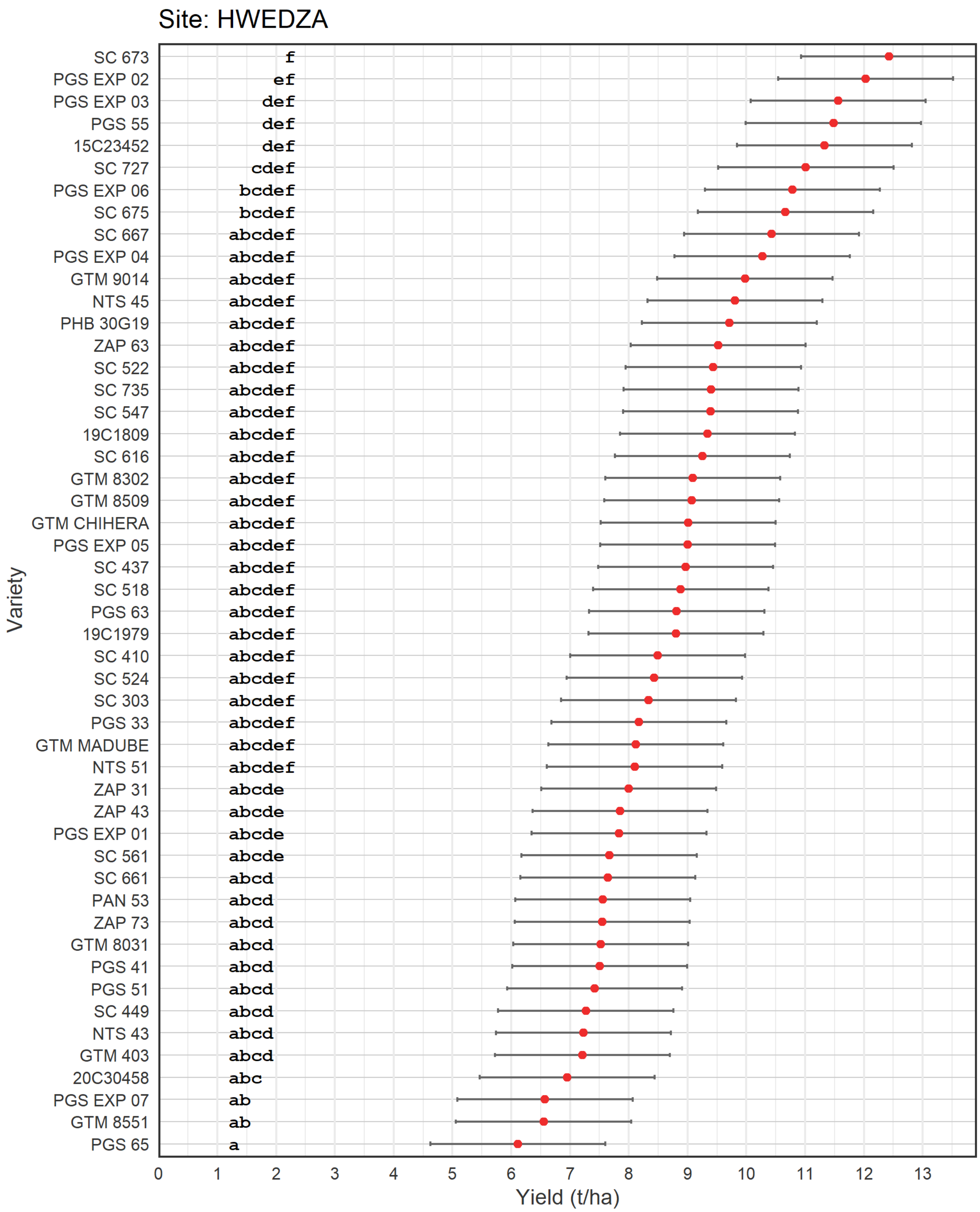
4
5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Variety
Yield (t/ha)
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NTS 45 abcdef
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ZAP 63 abcdef
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SC 735 abcdef
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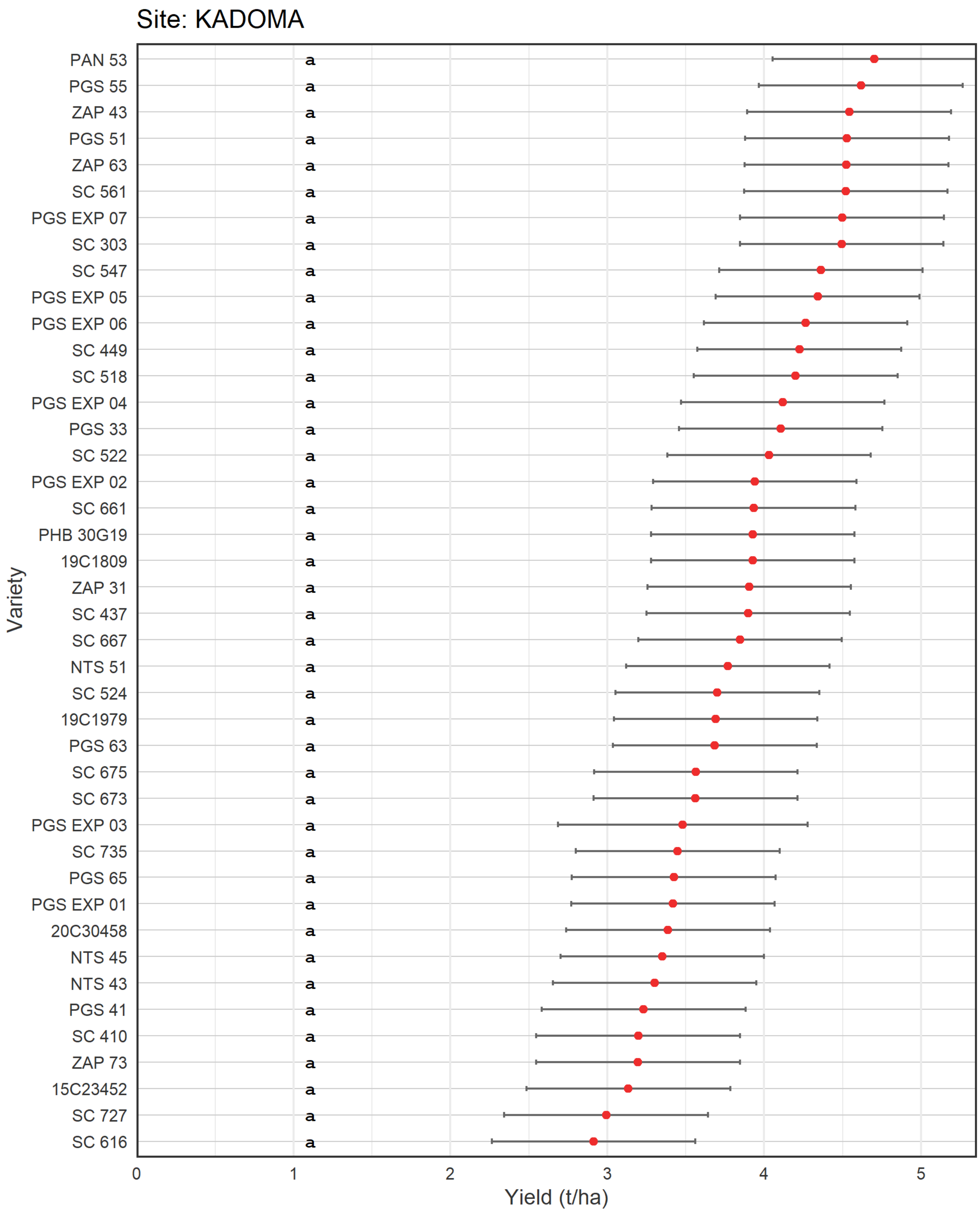
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19C1809
ZAP 31
SC 437
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SC 675
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NTS 45
NTS 43
PGS 41
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SC 727
SC 616
Variety
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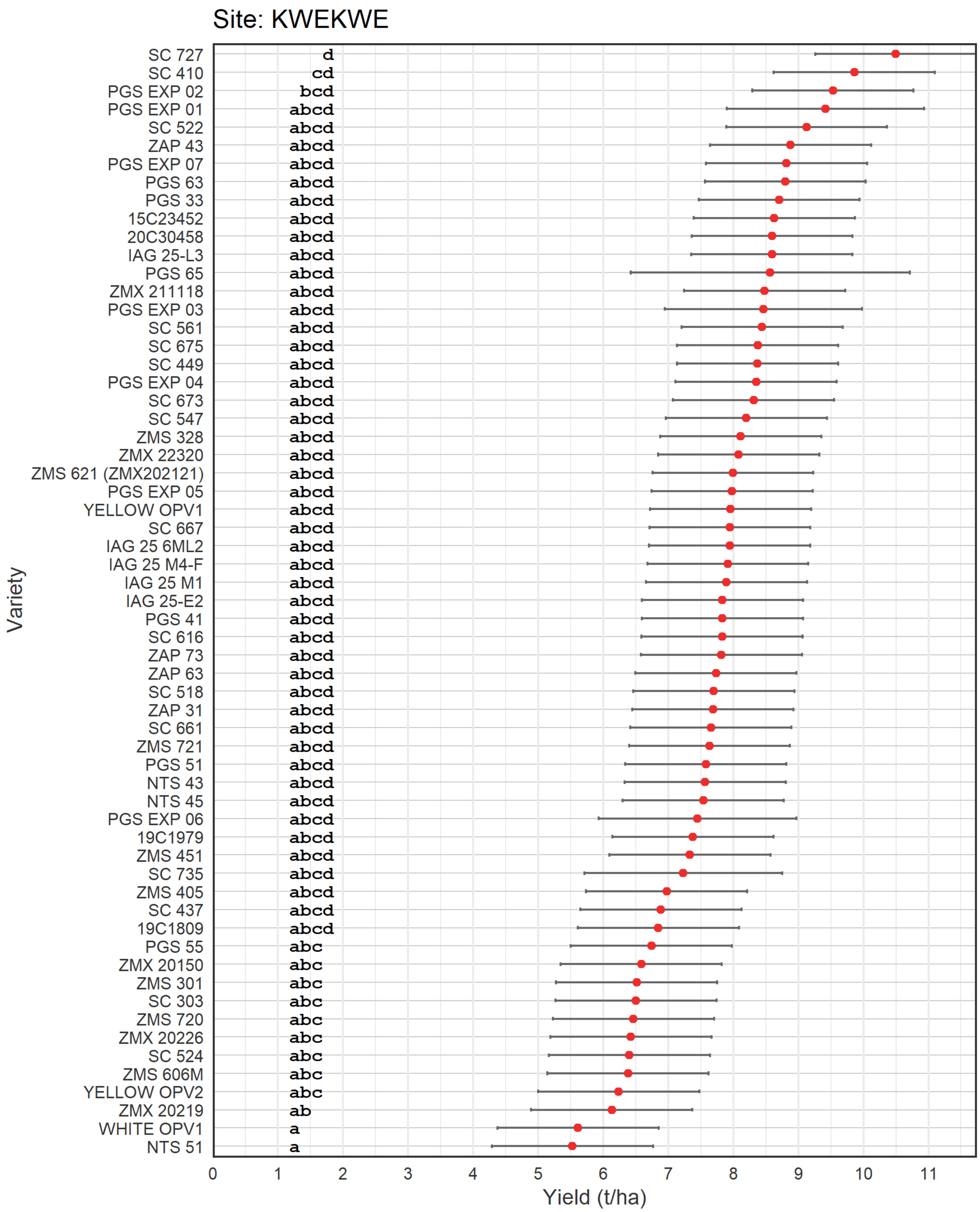
1
2
3
4
5
Yield (t/ha)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Variety
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SC 410 cd
PGS EXP 02 bcd
PGS EXP 01 abcd
SC 522 abcd
ZAP 43 abcd
PGS EXP 07 abcd
PGS 63 abcd
PGS 33 abcd
15C23452 abcd
20C30458 abcd
IAG 25-L3 abcd
PGS 65 abcd
ZMX 211118 abcd
PGS EXP 03 abcd
SC 561 abcd
SC 675 abcd
SC 449 abcd
PGS EXP 04 abcd
SC 673 abcd
SC 547 abcd
ZMS 328 abcd
ZMX 22320 abcd
ZMS 621 (ZMX202121) abcd
PGS EXP 05 abcd
YELLOW OPV1 abcd
SC 667 abcd
IAG 25 6ML2 abcd
IAG 25 M4-F abcd
IAG 25 M1 abcd
IAG 25-E2 abcd
PGS 41 abcd
SC 616 abcd
ZAP 73 abcd
ZAP 63 abcd
SC 518 abcd
ZAP 31 abcd
SC 661 abcd
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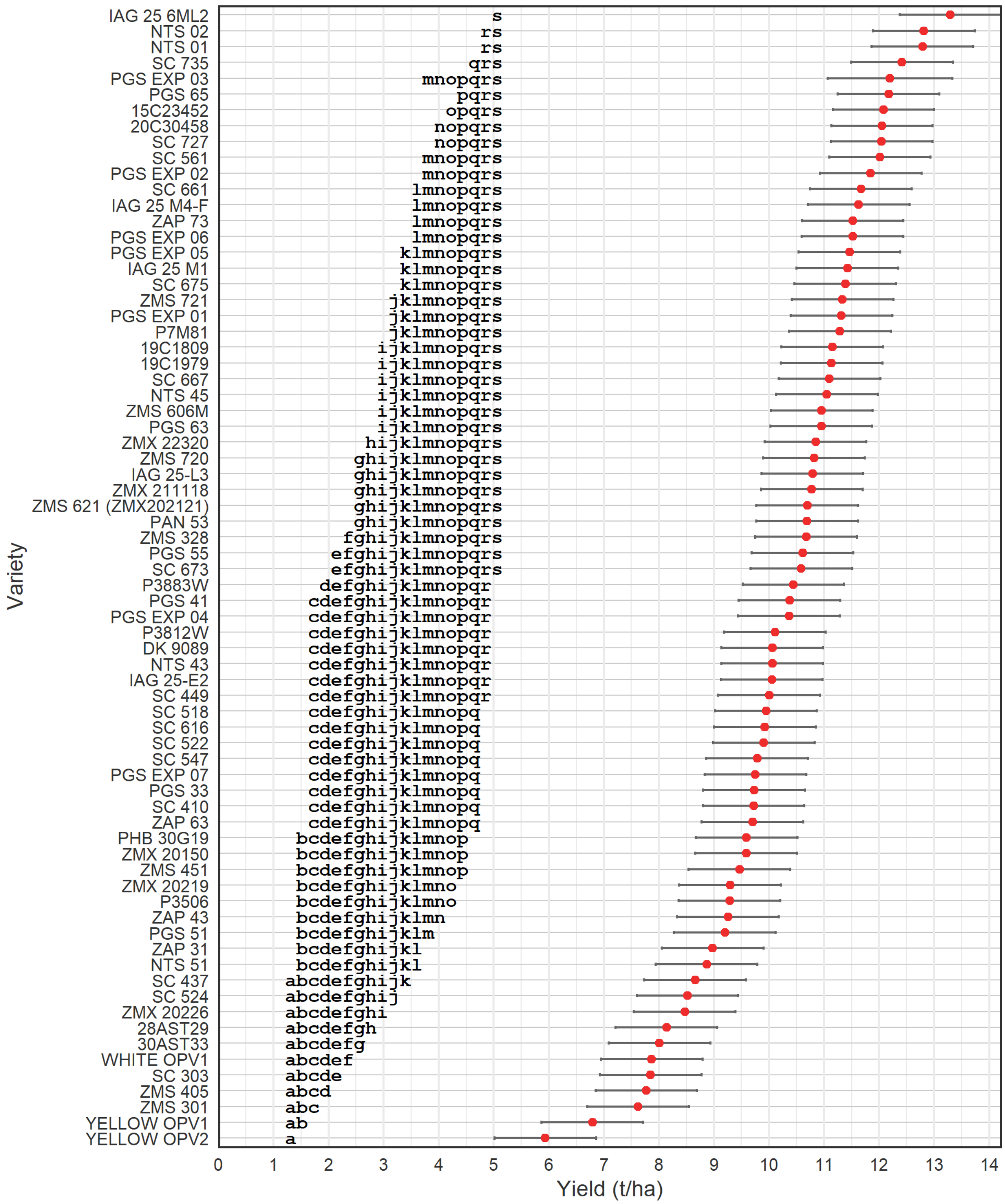
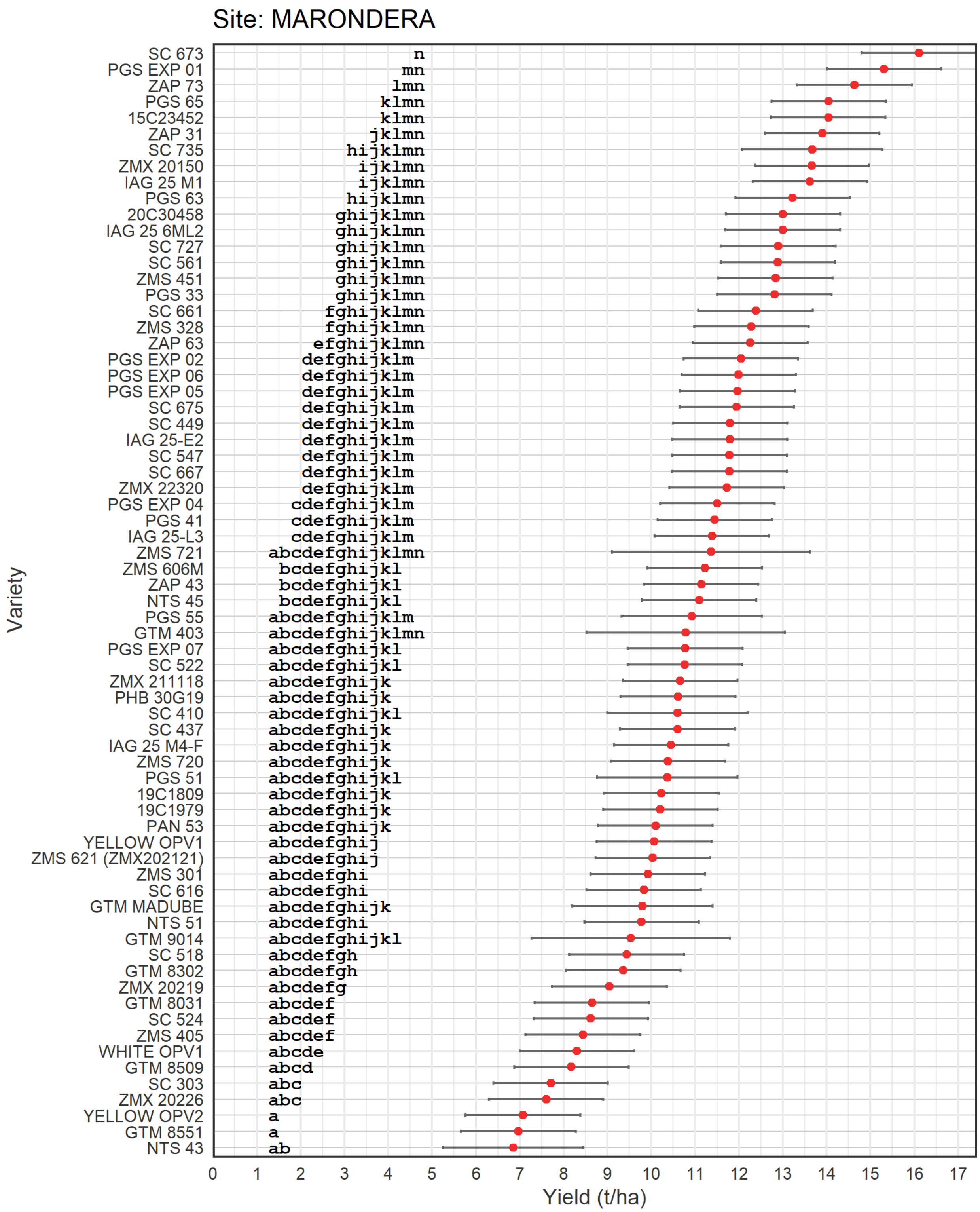
PGS 55 abc
ZMX 20150 abc
ZMS 301 abc
SC 303 abc
ZMS 720 abc
ZMX 20226 abc
SC 524 abc
ZMS 606M abc
YELLOW OPV2 abc
ZMX 20219 ab
WHITE OPV1 a
NTS 51 a
0 1 2 3 4 5 6 7 8 9 10 11
Yield (t/ha)

Site: LIONSDEN





Site: MARONDERA
Variety
Yield (t/ha)
SC 673 n
PGS EXP 01 mn
ZAP 73 lmn
PGS 65 klmn
15C23452 klmn
ZAP 31 jklmn
SC 735 hijklmn
ZMX 20150 ijklmn
IAG 25 M1 ijklmn
PGS 63 hijklmn
20C30458 ghijklmn
IAG 25 6ML2 ghijklmn
SC 727 ghijklmn
SC 561 ghijklmn
ZMS 451 ghijklmn
PGS 33 ghijklmn
SC 661 fghijklmn
ZMS 328 fghijklmn
ZAP 63 efghijklmn
PGS EXP 02 defghijklm
PGS EXP 06 defghijklm
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SC 675 defghijklm
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NTS 45 bcdefghijkl
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GTM 403 abcdefghijklmn
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SC 437 abcdefghijk
IAG 25 M4-F abcdefghijk
ZMS 720 abcdefghijk
PGS 51 abcdefghijkl
19C1809 abcdefghijk
19C1979 abcdefghijk
PAN 53 abcdefghijk
YELLOW OPV1 abcdefghij
ZMS 621 (ZMX202121) abcdefghij
ZMS 301 abcdefghi
SC 616 abcdefghi
GTM MADUBE abcdefghijk
NTS 51 abcdefghi
GTM 9014 abcdefghijkl
SC 518 abcdefgh
GTM 8302 abcdefgh
ZMX 20219 abcdefg
GTM 8031 abcdef
SC 524 abcdef
ZMS 405 abcdef
WHITE OPV1 abcde
GTM 8509 abcd
SC 303 abc
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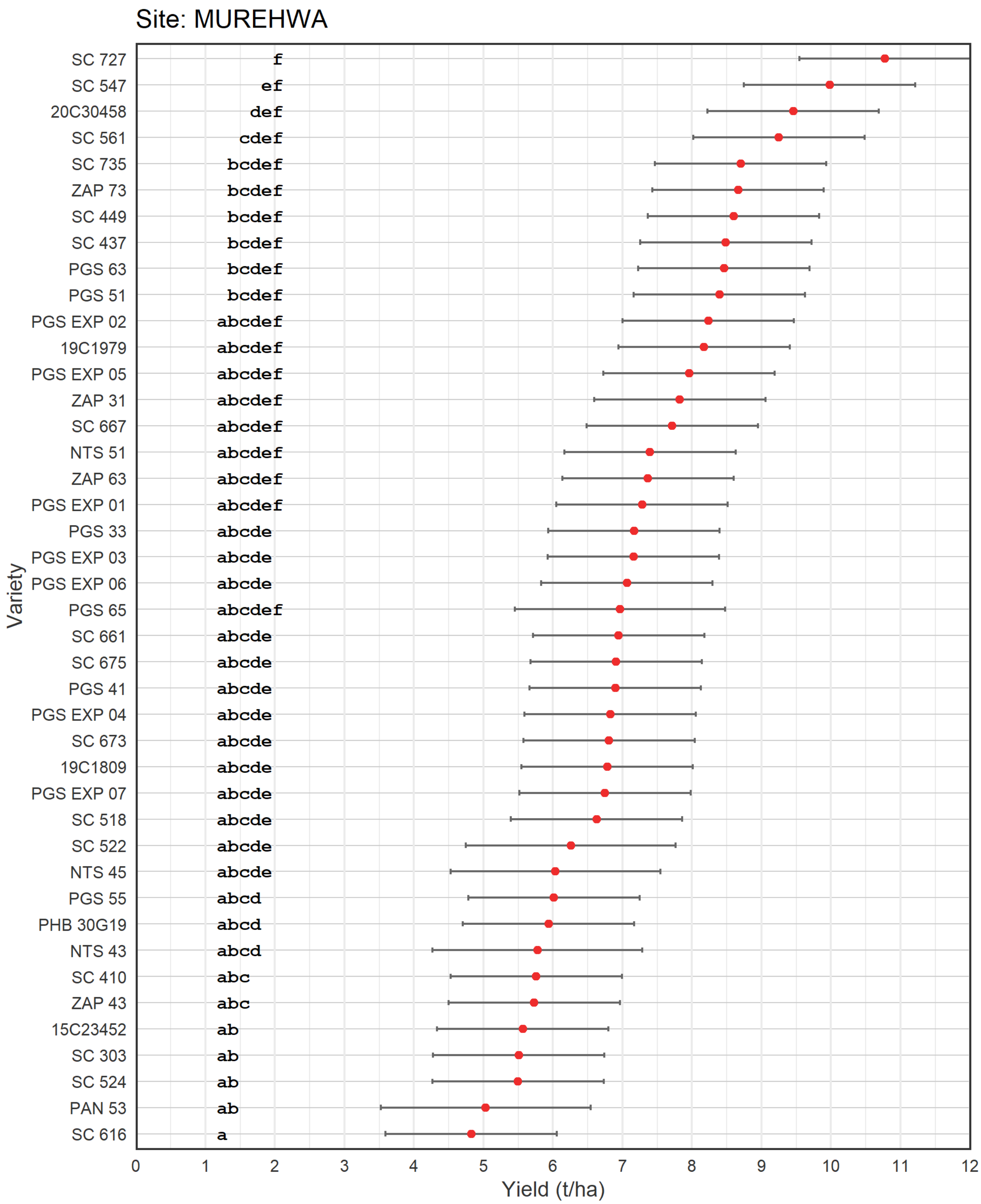
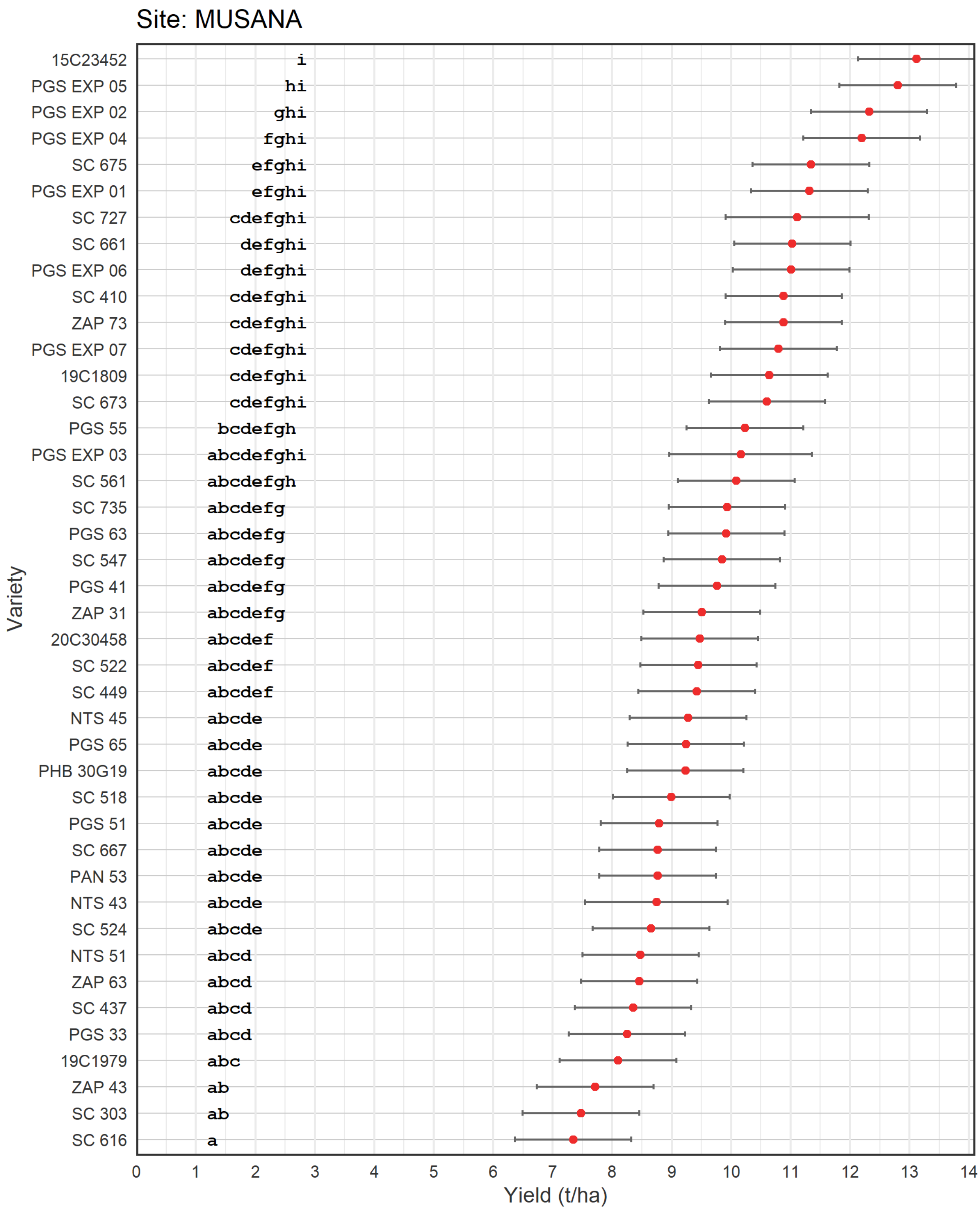
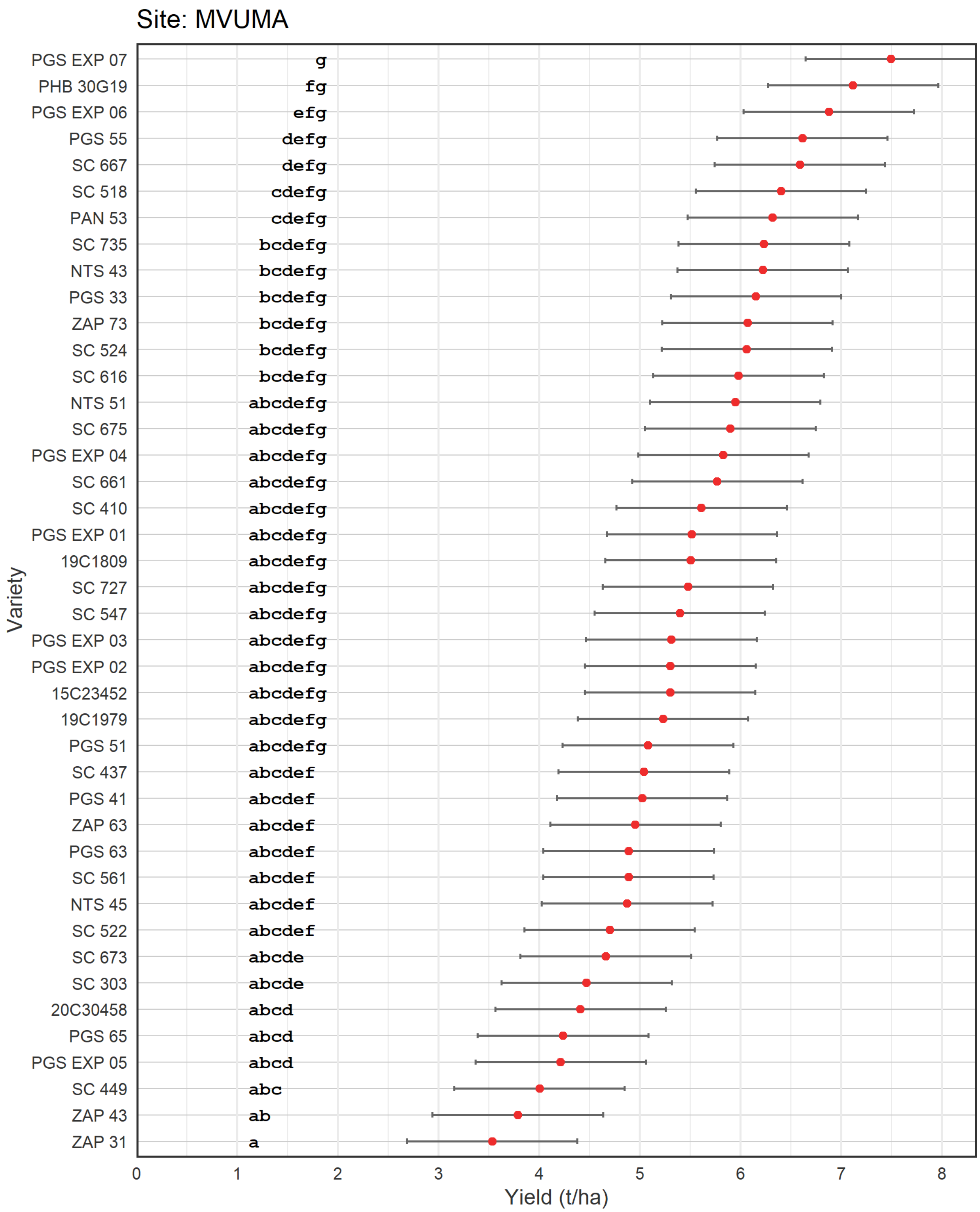
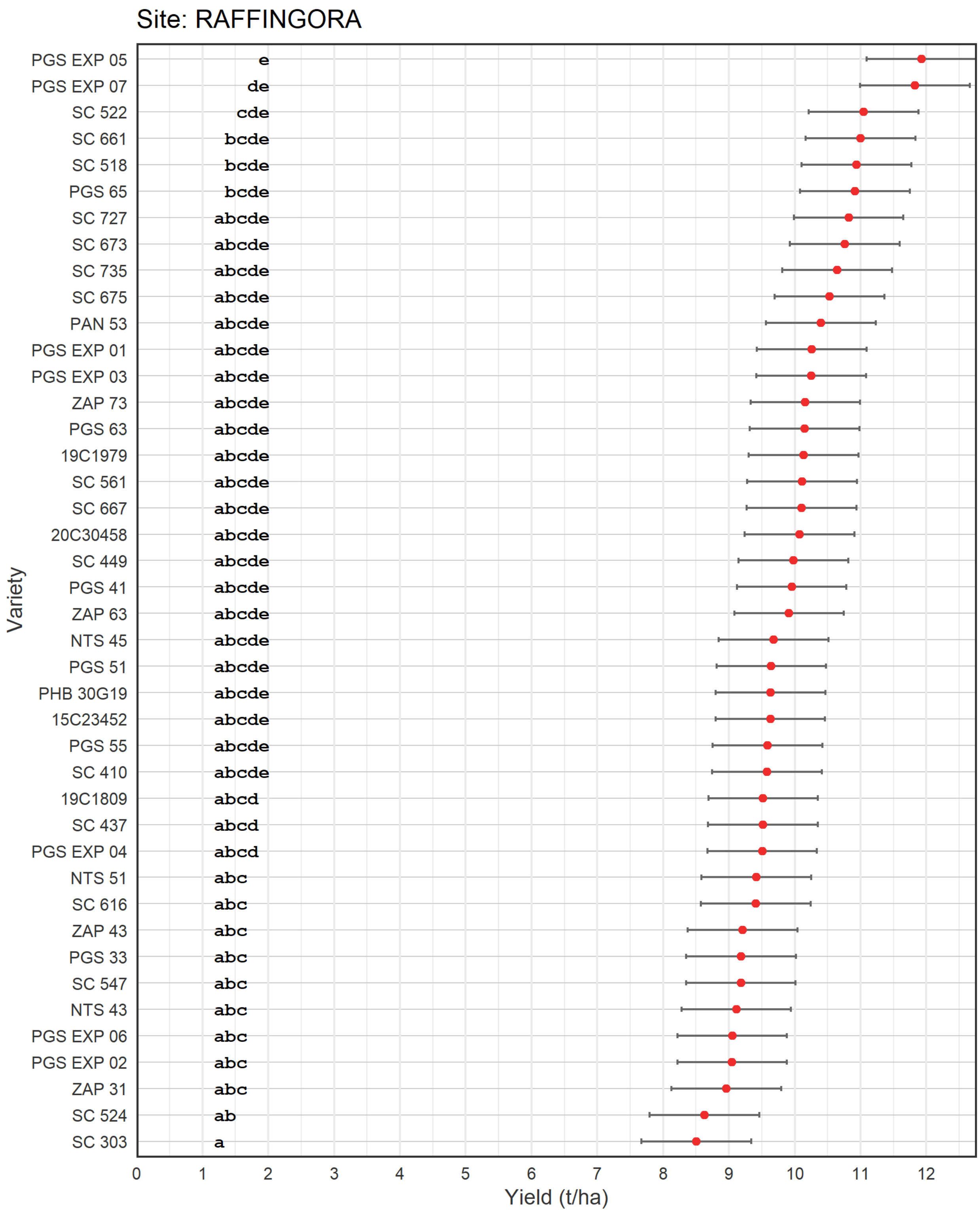
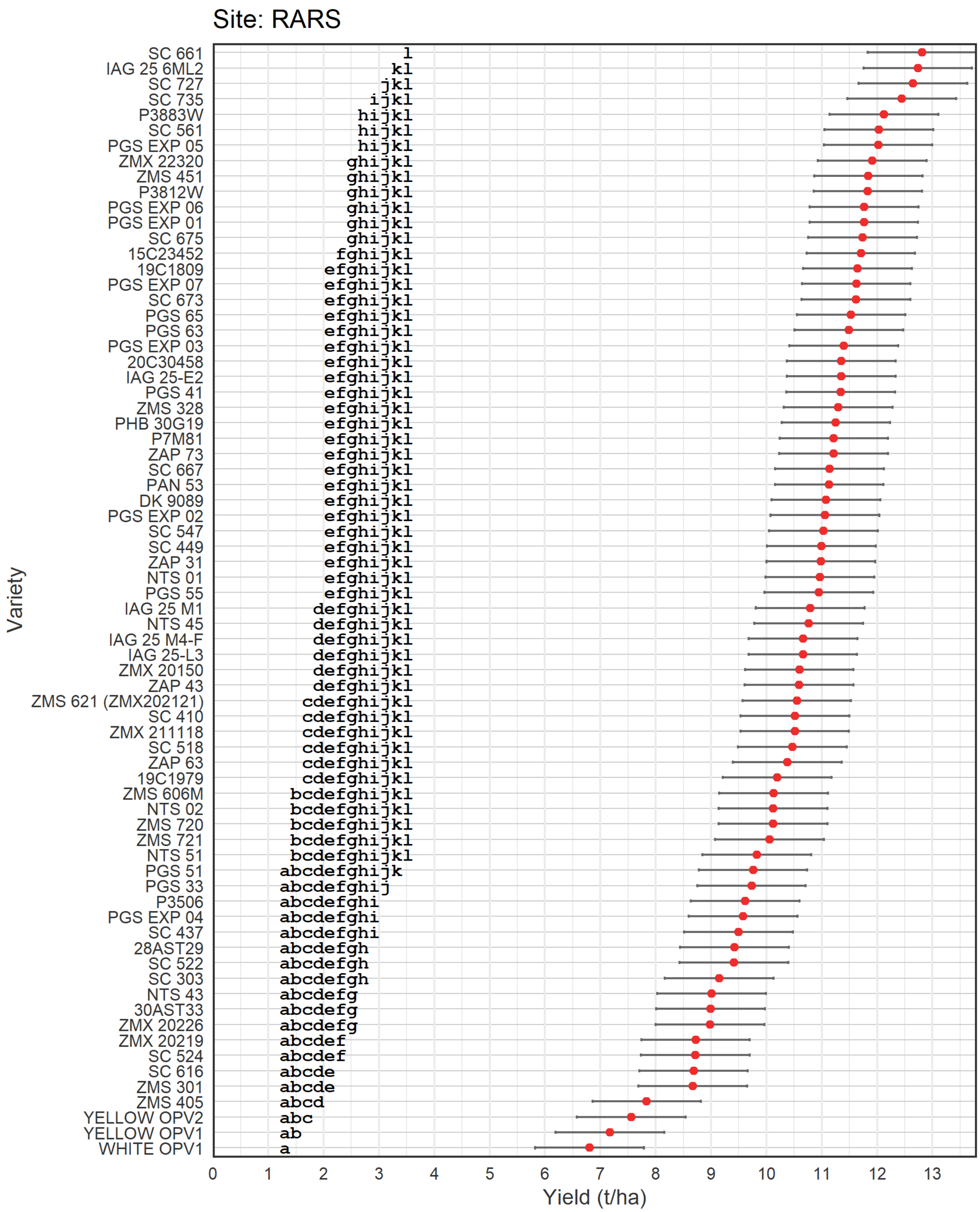
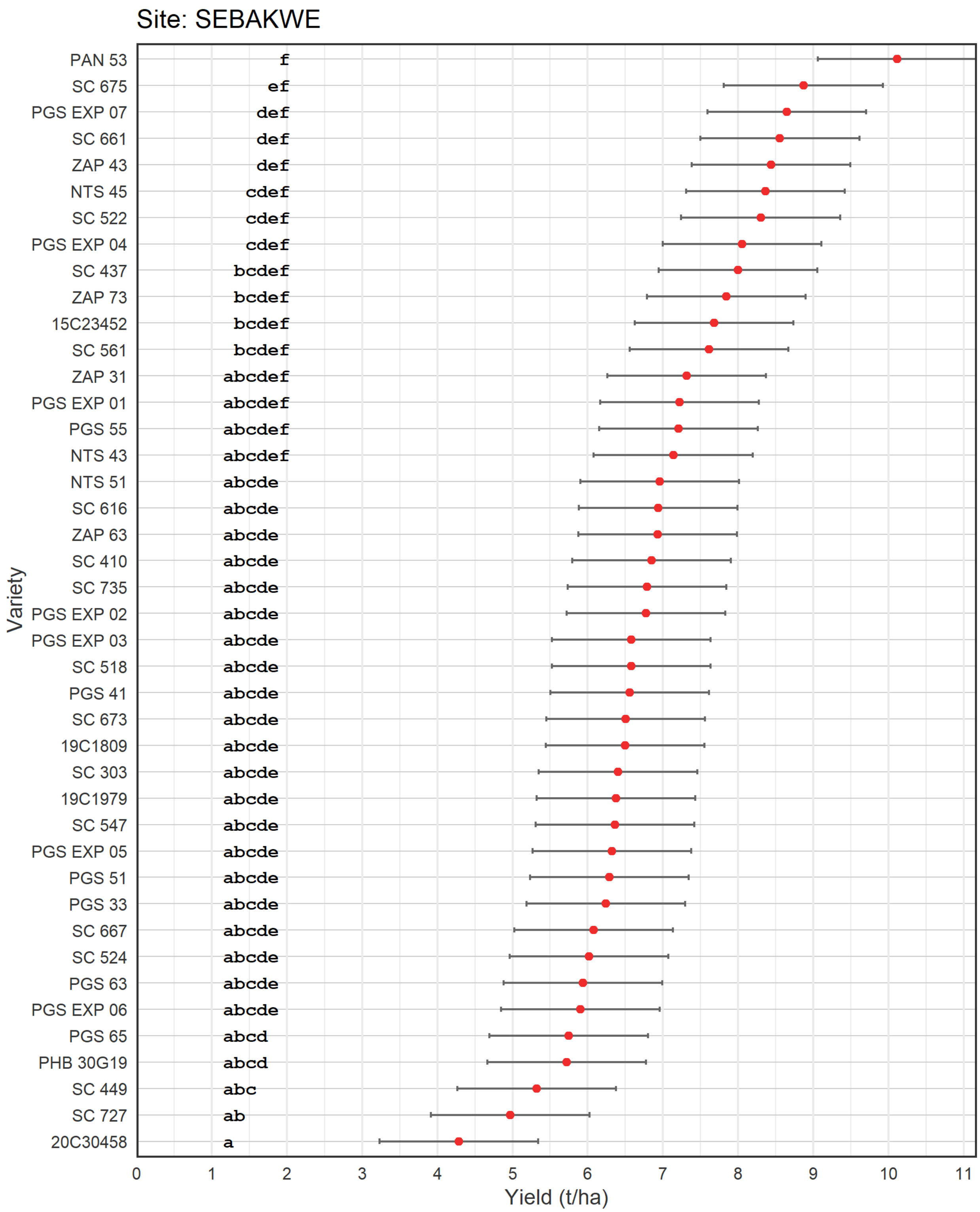

Site: MUREHWA
Variety
Yield (t/ha)
SC 727 f
SC 547 ef
20C30458 def
SC 561 cdef
SC 735 bcdef
ZAP 73 bcdef
SC 449 bcdef
SC 437 bcdef
PGS 63 bcdef
PGS 51 bcdef
PGS EXP 02 abcdef
19C1979 abcdef
PGS EXP 05 abcdef
ZAP 31 abcdef
SC 667 abcdef
NTS 51 abcdef
ZAP 63 abcdef
PGS EXP 01 abcdef
PGS 33 abcde
PGS EXP 03 abcde
PGS EXP 06 abcde
PGS 65 abcdef
SC 661 abcde
SC 675 abcde
PGS 41 abcde
PGS EXP 04 abcde
SC 673 abcde
19C1809 abcde
PGS EXP 07 abcde
SC 518 abcde
SC 522 abcde
NTS 45 abcde
PGS 55 abcd
PHB 30G19 abcd
NTS 43 abcd
SC 410 abc
ZAP 43 abc
15C23452 ab
SC 303 ab
SC 524 ab
PAN 53 ab
SC 616 a
0 1 2 3 4 5 6 7 8 9 10 11 12


Site: MUSANA
Variety
Yield (t/ha)
15C23452 i
PGS EXP 05 hi
PGS EXP 02 ghi
PGS EXP 04 fghi
SC 675 efghi
PGS EXP 01 efghi
SC 727 cdefghi
SC 661 defghi
PGS EXP 06 defghi
SC 410 cdefghi
ZAP 73 cdefghi
PGS EXP 07 cdefghi
19C1809 cdefghi
SC 673 cdefghi
PGS 55 bcdefgh
PGS EXP 03 abcdefghi
SC 561 abcdefgh
SC 735 abcdefg
PGS 63 abcdefg
SC 547 abcdefg
PGS 41 abcdefg
ZAP 31 abcdefg
20C30458 abcdef
SC 522 abcdef
SC 449 abcdef
NTS 45 abcde
PGS 65 abcde
PHB 30G19 abcde
SC 518 abcde
PGS 51 abcde
SC 667 abcde
PAN 53 abcde
NTS 43 abcde
SC 524 abcde
NTS 51 abcd
ZAP 63 abcd
SC 437 abcd
PGS 33 abcd
19C1979 abc
ZAP 43 ab
SC 303 ab
SC 616 a
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14

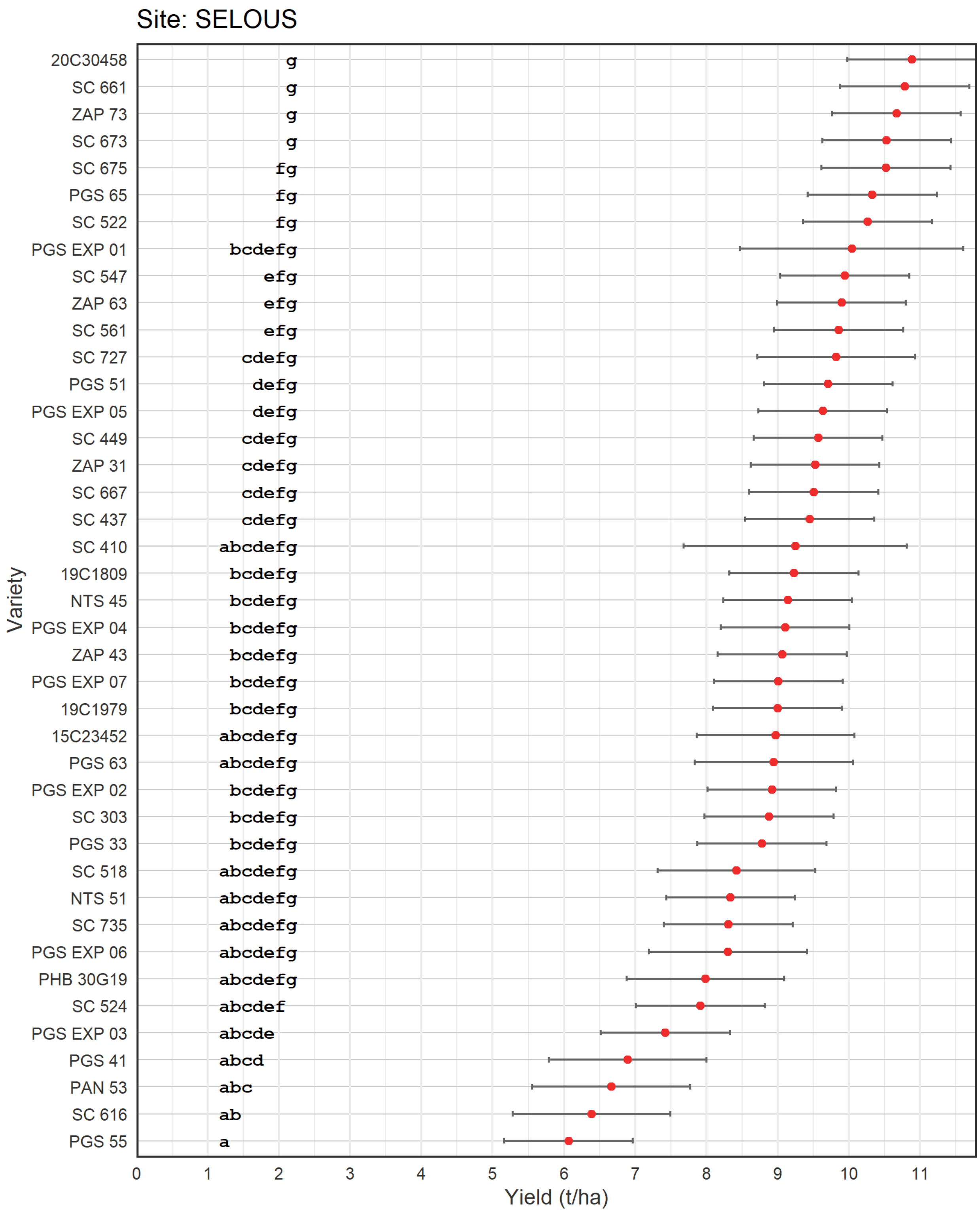

Site: MVUMA
PGS EXP 07
PHB 30G19
PGS EXP 06
PGS 55
SC 667
SC 518
PAN 53
SC 735
NTS 43
PGS 33
ZAP 73
SC 524
SC 616
NTS 51
SC 675
PGS EXP 04
SC 661
SC 410
PGS EXP 01
19C1809
SC 727
SC 547
PGS EXP 03
PGS EXP 02
15C23452
19C1979
PGS 51
SC 437
PGS 41
ZAP 63
PGS 63
SC 561
NTS 45
SC 522
SC 673
SC 303
20C30458
PGS 65
PGS EXP 05
SC 449
ZAP 43
ZAP 31
g
fg
efg
defg
defg
cdefg
cdefg
bcdefg
bcdefg
bcdefg
bcdefg
bcdefg
bcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdefg
abcdef
abcdef
abcdef
abcdef
abcdef
abcdef
abcdef
abcde
abcde
abcd
abcd
abcd
abc
ab
a
Variety
0
1
2
3
4
5
6
7
8
Yield (t/ha)

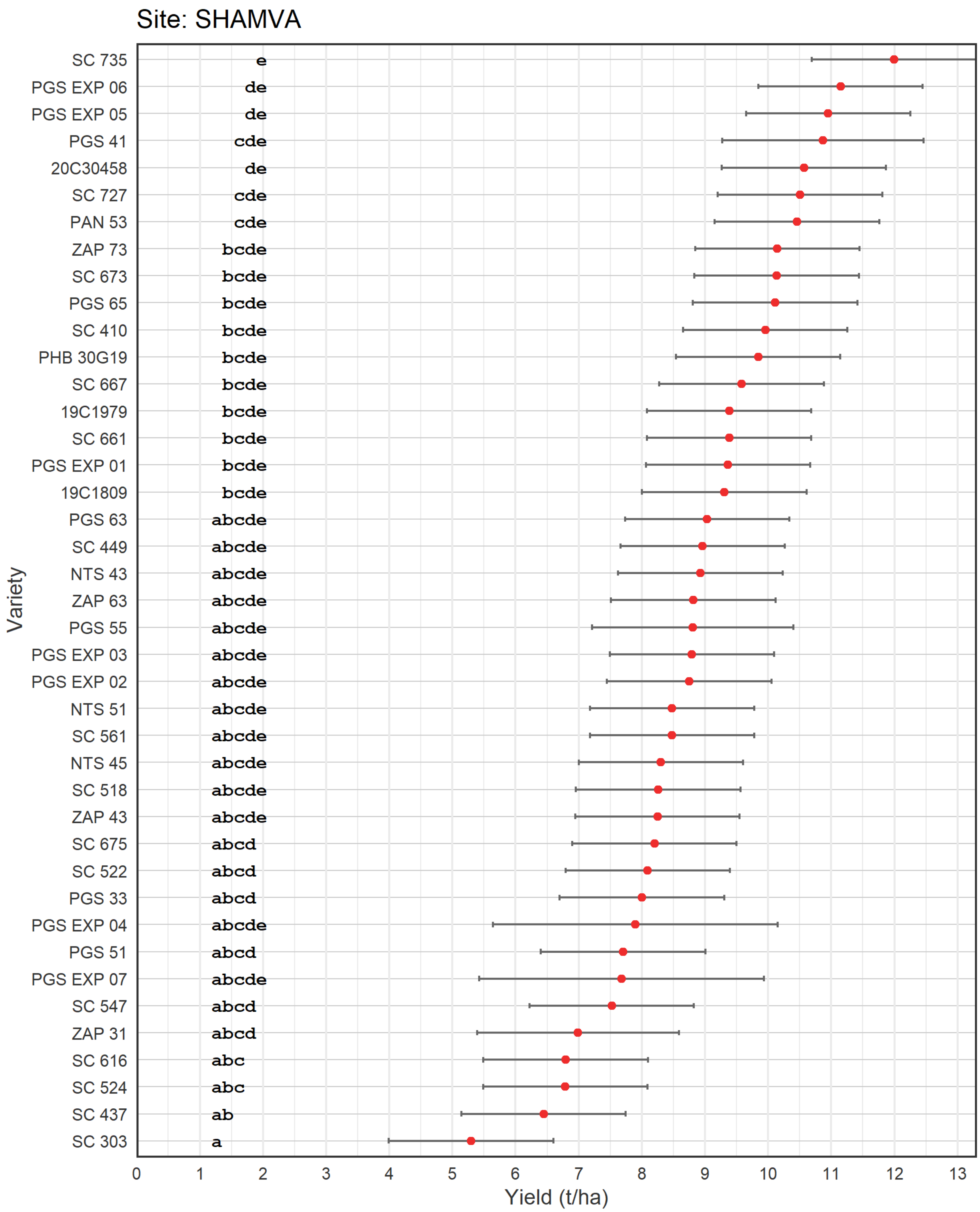

Site: RAFFINGORA
Variety
Yield (t/ha)
PGS EXP 05 e
PGS EXP 07 de
SC 522 cde
SC 661 bcde
SC 518 bcde
PGS 65 bcde
SC 727 abcde
SC 673 abcde
SC 735 abcde
SC 675 abcde
PAN 53 abcde
PGS EXP 01 abcde
PGS EXP 03 abcde
ZAP 73 abcde
PGS 63 abcde
19C1979 abcde
SC 561 abcde
SC 667 abcde
20C30458 abcde
SC 449 abcde
PGS 41 abcde
ZAP 63 abcde
NTS 45 abcde
PGS 51 abcde
PHB 30G19 abcde
15C23452 abcde
PGS 55 abcde
SC 410 abcde
19C1809 abcd
SC 437 abcd
PGS EXP 04 abcd
NTS 51 abc
SC 616 abc
ZAP 43 abc
PGS 33 abc
SC 547 abc
NTS 43 abc
PGS EXP 06 abc
PGS EXP 02 abc
ZAP 31 abc
SC 524 ab
SC 303 a
0 1 2 3 4 5 6 7 8 9 10 11 12


Site: RARS
Variety
Yield (t/ha)
0 1 2 3 4 5 6 7 8 9 10 11 12 13
SC 661 l
IAG 25 6ML2 kl
SC 727 jkl
SC 735 ijkl
P3883W hijkl
SC 561 hijkl
PGS EXP 05 hijkl
ZMX 22320 ghijkl
ZMS 451 ghijkl
P3812W ghijkl
PGS EXP 06 ghijkl
PGS EXP 01 ghijkl
SC 675 ghijkl
15C23452 fghijkl
19C1809 efghijkl
PGS EXP 07 efghijkl
SC 673 efghijkl
PGS 65 efghijkl
PGS 63 efghijkl
PGS EXP 03 efghijkl
20C30458 efghijkl
IAG 25-E2 efghijkl
PGS 41 efghijkl
ZMS 328 efghijkl
PHB 30G19 efghijkl
P7M81 efghijkl
ZAP 73 efghijkl
SC 667 efghijkl
PAN 53 efghijkl
DK 9089 efghijkl
PGS EXP 02 efghijkl
SC 547 efghijkl
SC 449 efghijkl
ZAP 31 efghijkl
NTS 01 efghijkl
PGS 55 efghijkl
IAG 25 M1 defghijkl
NTS 45 defghijkl
IAG 25 M4-F defghijkl
IAG 25-L3 defghijkl
ZMX 20150 defghijkl
ZAP 43 defghijkl
ZMS 621 (ZMX202121) cdefghijkl
SC 410 cdefghijkl
ZMX 211118 cdefghijkl
SC 518 cdefghijkl
ZAP 63 cdefghijkl
19C1979 cdefghijkl
ZMS 606M bcdefghijkl
NTS 02 bcdefghijkl
ZMS 720 bcdefghijkl
ZMS 721 bcdefghijkl
NTS 51 bcdefghijkl
PGS 51 abcdefghijk
PGS 33 abcdefghij
P3506 abcdefghi
PGS EXP 04 abcdefghi
SC 437 abcdefghi
28AST29 abcdefgh
SC 522 abcdefgh
SC 303 abcdefgh
NTS 43 abcdefg
30AST33 abcdefg
ZMX 20226 abcdefg
ZMX 20219 abcdef
SC 524 abcdef
SC 616 abcde
ZMS 301 abcde
ZMS 405 abcd
YELLOW OPV2 abc
YELLOW OPV1 ab
WHITE OPV1 a

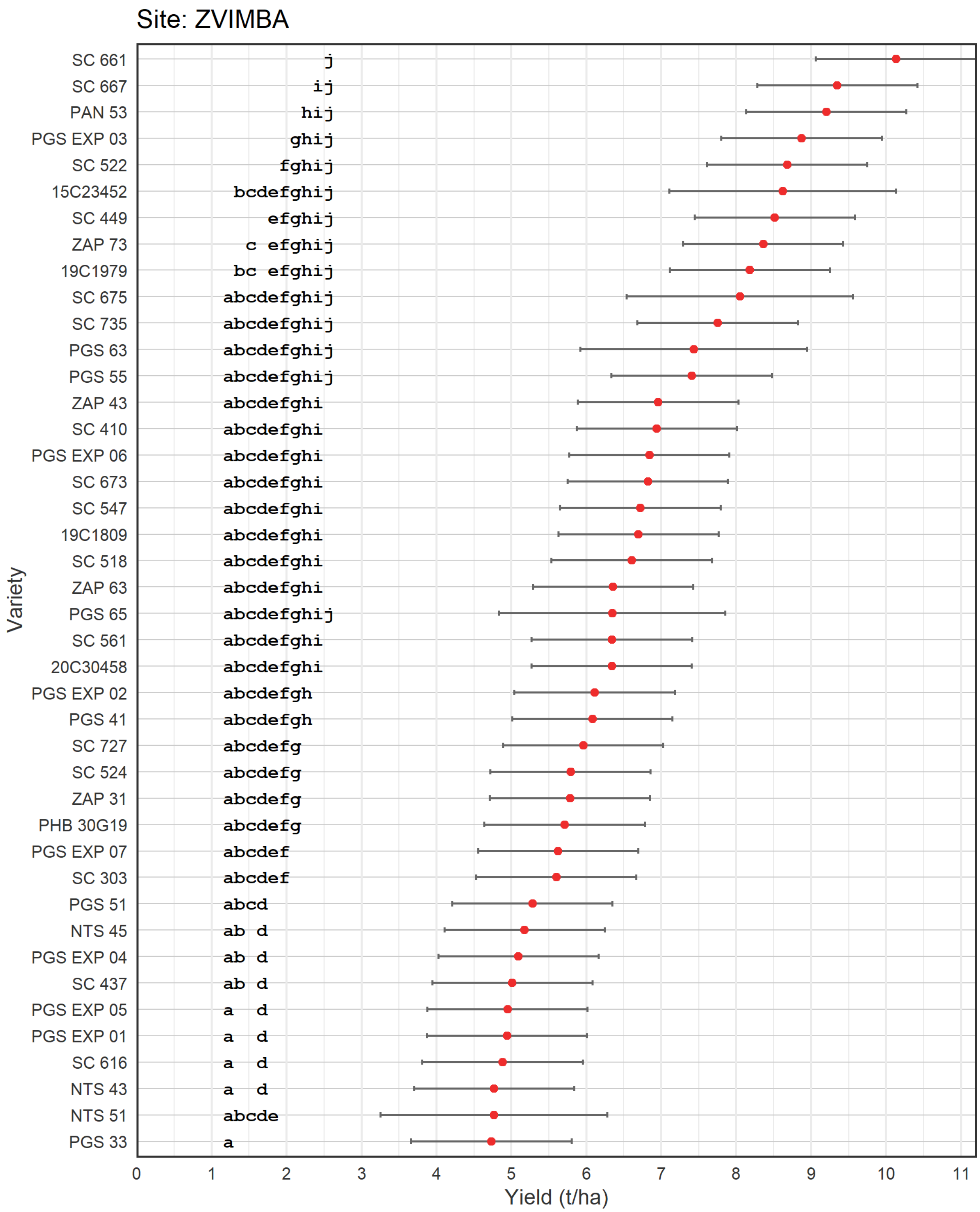


Site: SEBAKWE
Variety
PAN 53
f
SC 675
ef
PGS EXP 07
def
SC 661
def
ZAP 43
def
NTS 45
cdef
SC 522
cdef
PGS EXP 04
cdef
SC 437
bcdef
ZAP 73
bcdef
15C23452
bcdef
SC 561
bcdef
ZAP 31
abcdef
PGS EXP 01
abcdef
PGS 55
abcdef
NTS 43
abcdef
NTS 51
abcde
SC 616
abcde
ZAP 63
abcde
SC 410
abcde
SC 735
abcde
PGS EXP 02
abcde
PGS EXP 03
abcde
SC 518
abcde
PGS 41
abcde
SC 673
abcde
19C1809
abcde
SC 303
abcde
19C1979
abcde
SC 547
abcde
PGS EXP 05
abcde
PGS 51
abcde
PGS 33
abcde
SC 667
abcde
SC 524
abcde
PGS 63
abcde
PGS EXP 06
abcde
PGS 65
abcd
PHB 30G19
abcd
SC 449
abc
SC 727
ab
20C30458
a
0
1
2
3
4
5
6
7
8
9
10
11
Yield (t/ha)


Site: SELOUS
Variety
20C30458 g
SC 661 g
ZAP 73 g
SC 673 g
SC 675 fg
PGS 65 fg
SC 522 fg
PGS EXP 01 bcdefg
SC 547 efg
ZAP 63 efg
SC 561 efg
SC 727 cdefg
PGS 51 defg
PGS EXP 05 defg
SC 449 cdefg
ZAP 31 cdefg
SC 667 cdefg
SC 437 cdefg
SC 410 abcdefg
19C1809 bcdefg
NTS 45 bcdefg
PGS EXP 04 bcdefg
ZAP 43 bcdefg
PGS EXP 07 bcdefg
19C1979 bcdefg
15C23452 abcdefg
PGS 63 abcdefg
PGS EXP 02 bcdefg
SC 303 bcdefg
PGS 33 bcdefg
SC 518 abcdefg
NTS 51 abcdefg
SC 735 abcdefg
PGS EXP 06 abcdefg
PHB 30G19 abcdefg
SC 524 abcdef
PGS EXP 03 abcde
PGS 41 abcd
PAN 53 abc
SC 616 ab
PGS 55 a
0 1 2 3 4 5 6 7 8 9 10 11
Yield (t/ha)



Site: SHAMVA
Variety
Yield (t/ha)
SC 735 e
PGS EXP 06 de
PGS EXP 05 de
PGS 41 cde
20C30458 de
SC 727 cde
PAN 53 cde
ZAP 73 bcde
SC 673 bcde
PGS 65 bcde
SC 410 bcde
PHB 30G19 bcde
SC 667 bcde
19C1979 bcde
SC 661 bcde
PGS EXP 01 bcde
19C1809 bcde
PGS 63 abcde
SC 449 abcde
NTS 43 abcde
ZAP 63 abcde
PGS 55 abcde
PGS EXP 03 abcde
PGS EXP 02 abcde
NTS 51 abcde
SC 561 abcde
NTS 45 abcde
SC 518 abcde
ZAP 43 abcde
SC 675 abcd
SC 522 abcd
PGS 33 abcd
PGS EXP 04 abcde
PGS 51 abcd
PGS EXP 07 abcde
SC 547 abcd
ZAP 31 abcd
SC 616 abc
SC 524 abc
SC 437 ab
SC 303 a
0 1 2 3 4 5 6 7 8 9 10 11 12 13


Site: ZVIMBA
Variety
Yield (t/ha)
SC 661 j
SC 667 ij
PAN 53 hij
PGS EXP 03 ghij
SC 522 fghij
15C23452 bcdefghij
SC 449 efghij
ZAP 73 c efghij
19C1979 bc efghij
SC 675 abcdefghij
SC 735 abcdefghij
PGS 63 abcdefghij
PGS 55 abcdefghij
ZAP 43 abcdefghi
SC 410 abcdefghi
PGS EXP 06 abcdefghi
SC 673 abcdefghi
SC 547 abcdefghi
19C1809 abcdefghi
SC 518 abcdefghi
ZAP 63 abcdefghi
PGS 65 abcdefghij
SC 561 abcdefghi
20C30458 abcdefghi
PGS EXP 02 abcdefgh
PGS 41 abcdefgh
SC 727 abcdefg
SC 524 abcdefg
ZAP 31 abcdefg
PHB 30G19 abcdefg
PGS EXP 07 abcdef
SC 303 abcdef
PGS 51 abcd
NTS 45 ab d
PGS EXP 04 ab d
SC 437 ab d
PGS EXP 05 a d
PGS EXP 01 a d
SC 616 a d
NTS 43 a d
NTS 51 abcde
PGS 33 a
0 1 2 3 4 5 6 7 8 9 10 11

3.6.2 Yield vs Days to Maturity

In dryland farming systems and where timely planting of a winter crop is essential, it is important to take into account days to maturity. Figure 3.29 compares yield with days to maturity. One variety particularly stands out this year, SC 410, which has one of the shortest maturities on trial and yet a relatively high average yield, placing it in competition with many mid-season varieties.

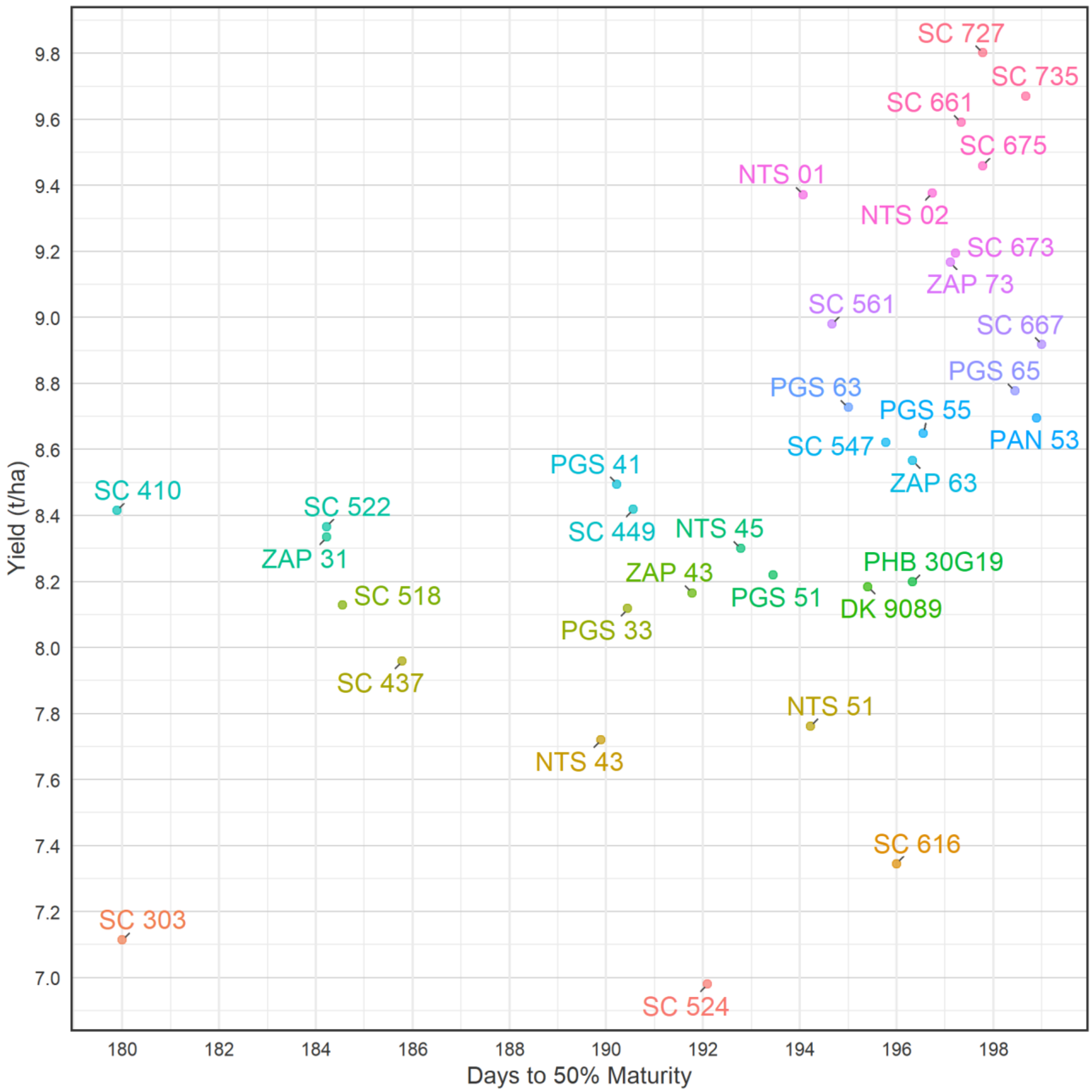


Figure 3.29: Grain yield

3.6.3 Yield Stability

Yield stability analysis tells us how consistently a variety performs across a range of environments. Figure 3.30 displays the 5 most stable and least stable released varieties. The most stable varieties have a flatter slope, meaning that they yield the most consistently across sites, despite mostly having lower yields overall. PAN 53 performed very consistently and maintained a relatively high yield in low-yielding sites, making it a good choice for smallholder farmers. SC 727 was very inconsistent across sites - it performed extremely well in high-yielding sites but average in low-yielding sites. Figure 3.31 displays each variety individually and ranks them according to stability.

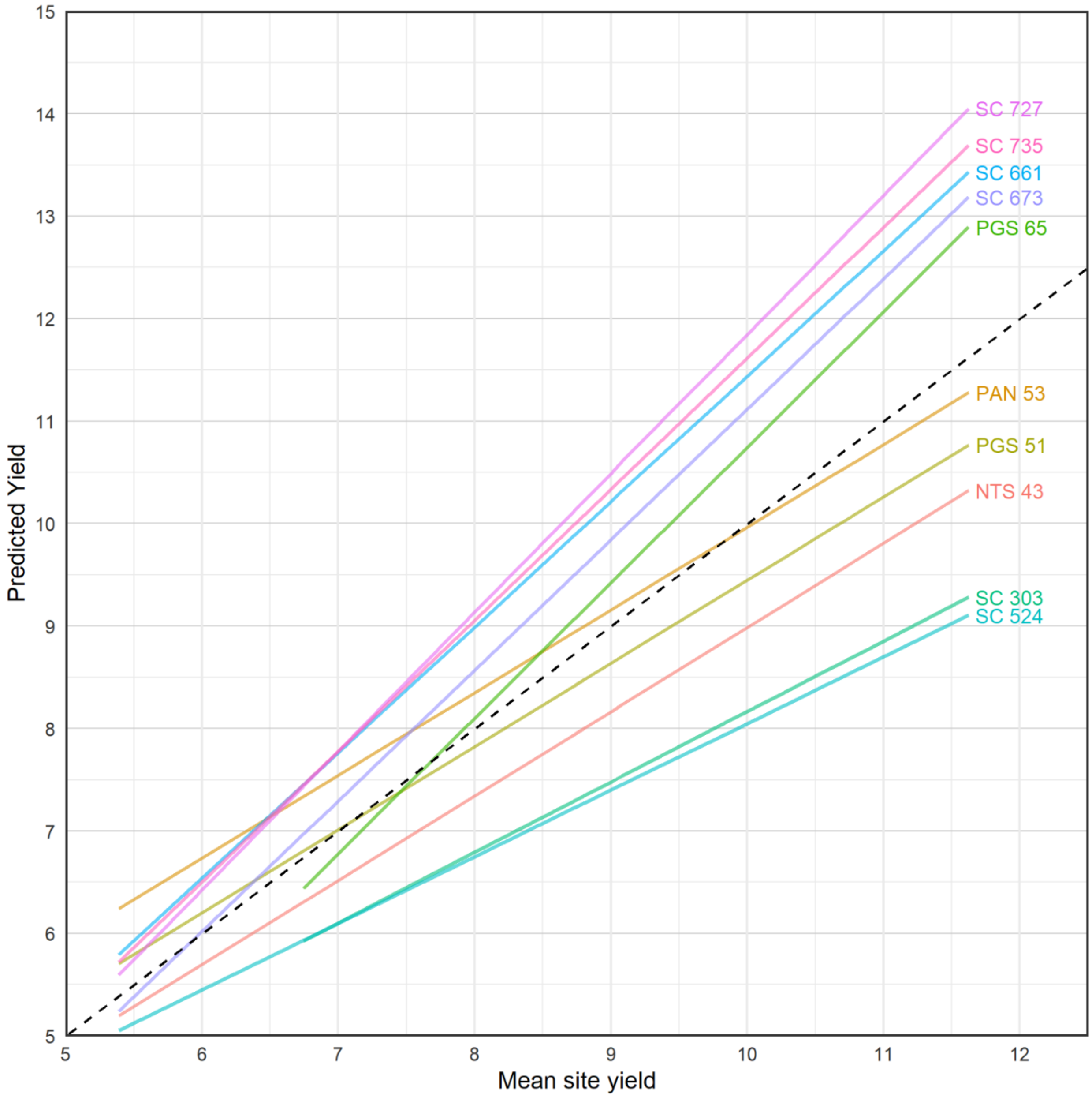


Figure 3.30: Genotype x Environment Stability analysis. Only the most and least stable released varieties shown. Black dashed line represents averahe performance at all sites. Only varietes represented at 8 or more sites were evaluated.

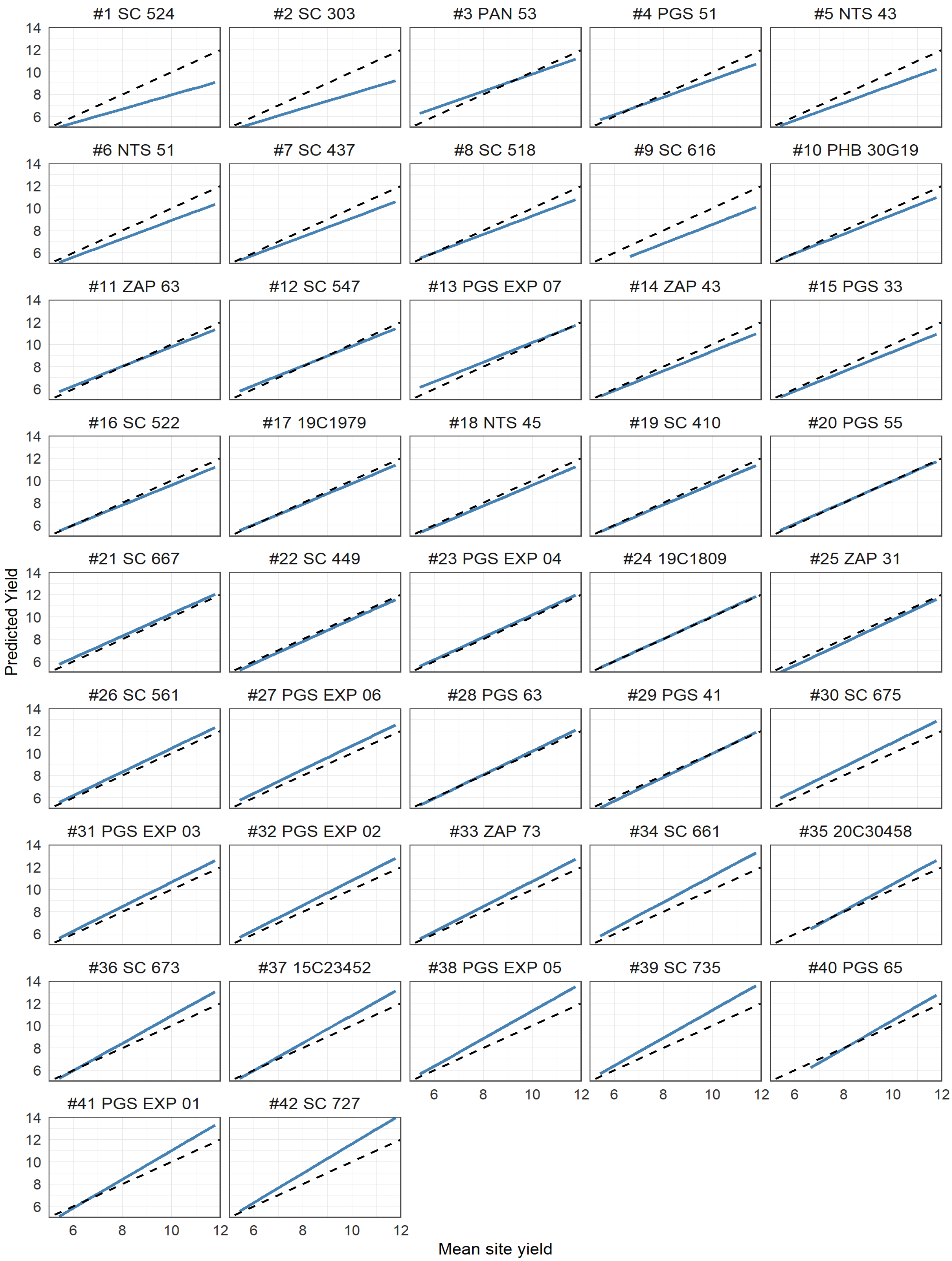


Figure 3.31: Finlay–Wilkinson regressions for all varieties, ordered by stability (sensitivity to environment). Dashed line is slope = 1. Only varieties tested at 8 or more sites evaluated.

4 Conclusion

This trial was conducted to assess the performance of commercial and experimental maize varieties. It included cultivars from multiple clients and several check varieties. This report presents only released varieties in the experiment, with a comparison of released and experimental varieties, including site-specific analyses, available for free download online at www.artfarm.co.zw. The evaluation provided valuable insight into the agronomic potential of the tested lines under the conditions of the 2024–25 season. Various important traits were recorded and analyzed to support variety selection and future advancement decisions. The inclusion of both commercial benchmarks and experimental entries allowed for direct comparison of breeding progress and identification of promising new material. Results from this trial will inform variety recommendations, future breeding directions, and potential release considerations.

5 Acknowledgements

ART wishes to express their sincere gratitude to Seed Co Ltd for the use of facilities at Rattray-Arnold Research Station and Kadoma Research Station, including data capturing. In addition, special thanks is extended to the farmers at each of the off-station sites where the trials were hosted. Finally, to each of the seed houses who provide the financial support to make this work possible.

6 Methods

6.1 Experimental Design

20 Sites were planted during the Summer 2024-5 season. These comprised 15 commercial sites and 5 communal sites. One of the commercial sites was a write-off due to lack of irrigation during the December drought and no data was recorded (Mvurwi). Four check cultivars were included, namely PGS 65, SC 727, SC 410, ZAP 31, and PHB 30G19. The trial design was a complete-block randomised design with three replications. Treatments were randomised separately for each site. Plots were 4 rows wide at 0.9m row spacing, and 5m long, resulting in a gross plot area of 18m^2. The harvested (net) plot was 2 rows wide and 4m long, a total of 7.2m^2, taken from the center of the gross plot.

6.2 Data capture

Days to mid pollen shed, days to mid silking, all disease scores, and plant height were taken only at 3 sites, namely ART, RARS, and Kadoma. Rust (*Puccinia spp.*), Northern Leaf Blight (*Exserohilium turcicum*), Grey Leaf spot (*Cercospora zeae-maydis*), Maize Streak Virus (*Mastrevirus spp.*) scores were all assessed using a 0-5 scale of severity with 0 being no sign of disease and 5 being very heavy disease present. All remaining variables were captured at all sites. Yield was corrected to 12.5% moisture at harvest

6.3 Data analysis

Randomisation, field plans, and data analysis was performed using the RStudio statistical analysis software.

Data were analyzed using mixed-effects models appropriate to the type and distribution of each trait. For continuous agronomic traits, linear mixed models were used to estimate variety effects while accounting for random variation due to replication and site differences. These models allowed the calculation of adjusted means for each variety at each site, followed by the assignment of rankings and comparison groupings using compact letter displays to indicate statistically distinct performance.

For traits measured on an ordinal or count scale—such as disease severity ratings—generalized linear mixed models with a negative binomial distribution and zero-inflation structure were applied. These models accounted for both overdispersion and the high frequency of zero scores observed in the data. 1-5 Disease scores were transformed to 0-4 scores for zero inflation correction.

All models included random effects to capture the hierarchical structure of the experimental design, including site and replication within site, as well as variety-by-environment interactions where appropriate. Diagnostic checks were performed to assess model assumptions, including residual distributions and variance estimates. For yield stability analysis, Finlay-Wilkinson regression was used.

For site-specific analysis, a linear model was applied to each site. Tukeys HSD test was used to determine significant differences.