# Highlights of the 2023 Southern Africa Regional Trials Coordinated by CIMMYT

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Southern Africa Product Advancement Meeting

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# 2022-23 Season Characteristics Vs Evaluation

- Delayed meaningful/planting rains until Mid December for rainfed conditions
- Early termination of rains …Mid March …
  - Disadvantaged the intermediate to late hybrids
  - Slow to no full development of foliar diseases
  - More sites classified as random drought stress sites
  - Confounding effects in Low N blocks due to moisture stress
- CIMMYT Corn Tour done for  Hybrid Selections at Grain Filling Stage

# TPP and Number of Hybrids Evaluated

| 2022/23 Season RT Number of Entries Tested | | | | |
|---|---|---|---|---|
| Target Product Profile | CIMMYT Candidates | Partner Entries | Checks | Total |
| | | | | |
| SA-PP1a - Intermediate | 19 | 12 | 9 | 40 |
| | | | | |
| SA-PP1b -Late | 9 | 0 | 11 | 20 |
| | | | | |
| Total | 28 | 12 | 20 | 60 |
| % Contribution | 47 | 20 | 33 | 100 |

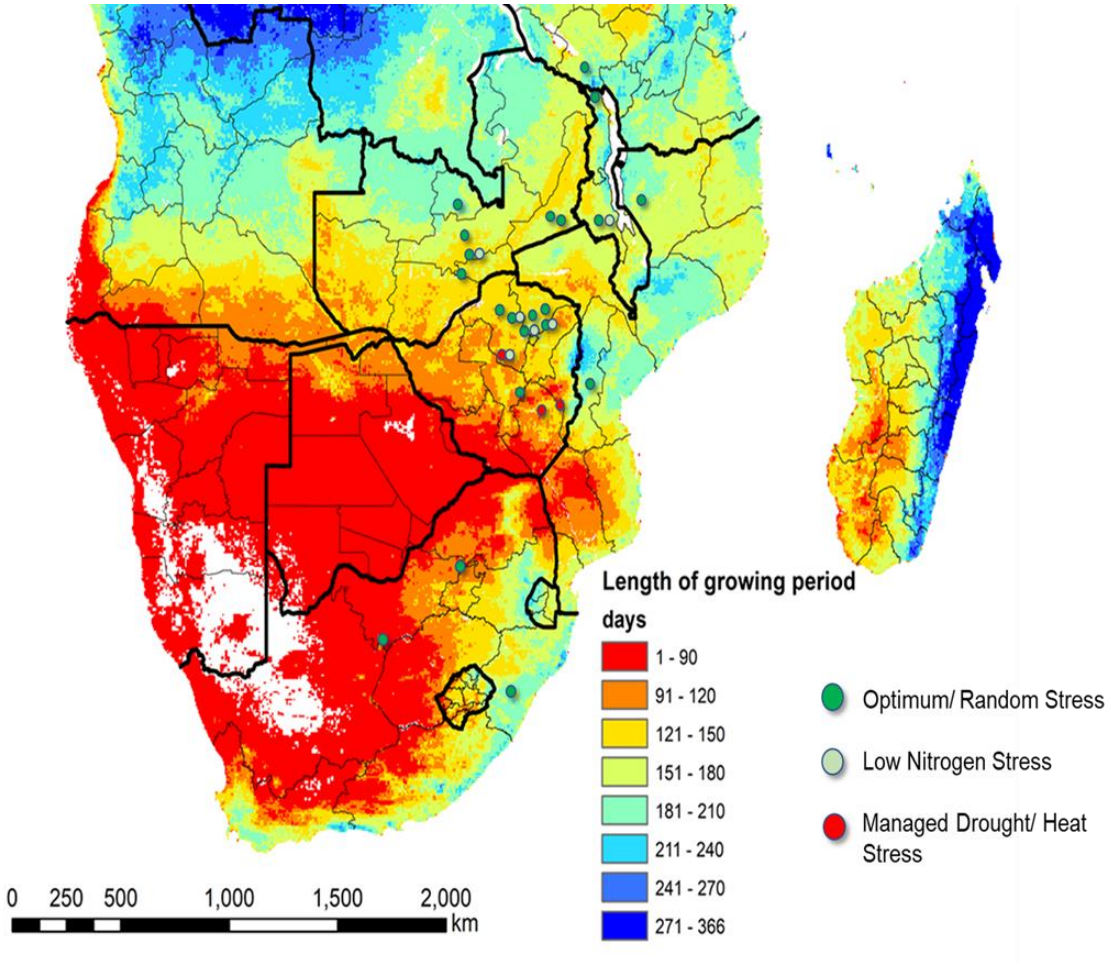
# Trial Sites and Data Management

**2022/23 Season RT Number of Entries Tested**

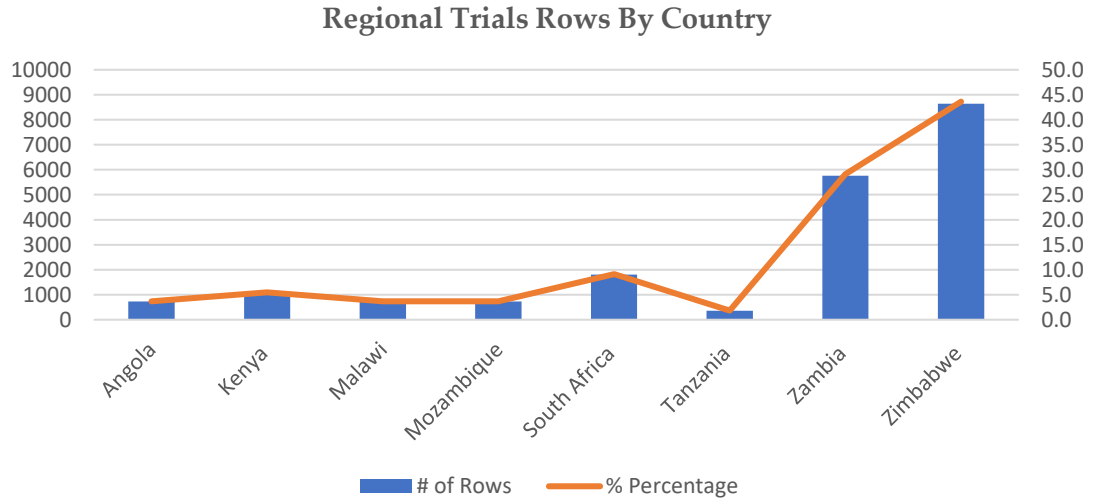
| Target Product Profile | CIMMYT Candidates | Partner Entries | Checks | Total |
|---|---|---|---|---|
| **CIM23SAPP1a - Intermediate** | **19** | **12** | **9** | **40** |
| **CIM23SAPP1b -Late** | **9** | **0** | **11** | **20** |
| **Total** | **28** | **12** | **20** | **60** |
| **% Contribution** | **47** | **20** | **33** | **100** |

| Trial Name/TPP | # Trials | # Trials Not Planted | # Trials written-off After planting | # Poor Data Quality | No Data Return | # Trials used for analysis |
|---|---|---|---|---|---|---|
| CIM23SAPP1a-Inter | 50 | 3 | 3 | 4 | 2 | 38 |
| CIM23SAPP1b-Late | 50 | 3 | 3 | 3 | 2 | 39 |
| Total | **100** | **4** | **6** | **7** | **4** | **77** |
| **Private / SMEs** | 36 | 2 | 2 | 4 | 2 | 26 |
| **NARS** | 32 | 0 | 0 | 3 | 0 | 29 |
| **CIMMYT** | 32 | 0 | 4 | 0 | 1/6 (Dizz Scores) | 27 |

# Southern Africa Evaluation Sites : Rows Per Country




| Country | # of Rows | % Percentage |
|---|---|---|
| Angola | 720 | 3.6 |
| Kenya | 1080 | 5.5 |
| Malawi | 720 | 3.6 |
| Mozambique | 720 | 3.6 |
| South Africa | 1800 | 9.1 |
| Tanzania | 360 | 1.8 |
| Zambia | 5760 | 29.1 |
| Zimbabwe | 8640 | 43.6 |



# Southern Africa Selection Traits

| | | | | |
|---|---|---|---|---|
| **Yield** | Yield under optimum conditions | tons/ha | At least 5% greater than or at par with relevant | Essential |
| | Yield under drought stress | tons/ha | At least 5% greater than or at par with best trait check | Essential |
| | Yield under low N stress (nitrogen use | tons/ha | At least 5% greater than or at par with best trait check | Essential |
| | Yield under heat stress | tons/ha | At least 5% greater than or at par with best trait check | Essential |
| | Yield under rainfed stress prone environment | tons/ha | At least 5% greater than or at par with best trait check | Essential |
| **Agronomic traits** | Root lodging resistance | % | Under optimal - ≤10% lodging or at par with (mean) | Essential |
| | Stalk lodging resistance | % | Under optimal - ≤10% lodging or at par with (mean) | Essential |
| | Moisture at harvest | **%** | <20% at harvest | Essential |
| | ASI | days | ≤5 days under drought | Essential |
| | Stay-green | 1 to 10 | ≤ 6.0 Senescence score at physiological maturity | Nice to have |
| | Plant Height | m | <3.5m | Essential |
| | Ear position | ratio | <0.5 | Essential |
| | Tip-filling | 1 to 5 | ≤3.0 Ear Aspect score or at par with (mean) commercial | Essential |
| **Disease traits** | Gray Leaf Spot (GLS) resistance | 1 to 9 | ≤4.0 GLS score | Essential |
| | Fusarium Ear Rot (FER) resistance | % | Less than 10% incidence | Essential |
| | Maize Lethal Necrosis (MLN) resistance | 1 to 9 | MLN score 4.0 or less | Nice to have |
| | Yield under artificial MLN | tons/ha | at least 4 t/ha under artificial MLN infestation | Nice to have |
| | Maize Streak Virus (MSV) resistance | 1 to 9 | <3 MSV score (on 1-9 scale) | Essential |
| | Common Rust (PS) resistance | 1 to 9 | <4.0 PS score | Essential |
| | Turcicum Leaf Blight (TLB) resistance | 1 to 9 | ≤4.0 TLB score | Essential |
| **Insect traits** | Fall Armyworm (FAW) resistance leaf damage | 1 to 9 | ≤5 | Nice to have |
| | Fall Armyworm (FAW) resistance cob damage | 1 to 9 | ≤3.0 | Nice to have |
| **Production/Multiplication Traits** | Production split/synchronization | Days | between ±5 | Essential |
| | Inbred line | t/ha | ≥1.5 | Essential |
| | Single cross | t/ha | ≥4.5 | Essential |
| | Male plant height : female ear height ratio | | ≥1 | Essential |

# Data Management : Site Classification

- Overall Site Yield Performance
- Site Heritability
- Correlation with other sites
- GIS support data for the season
- Some Optimal sites were then classified as Random Stress

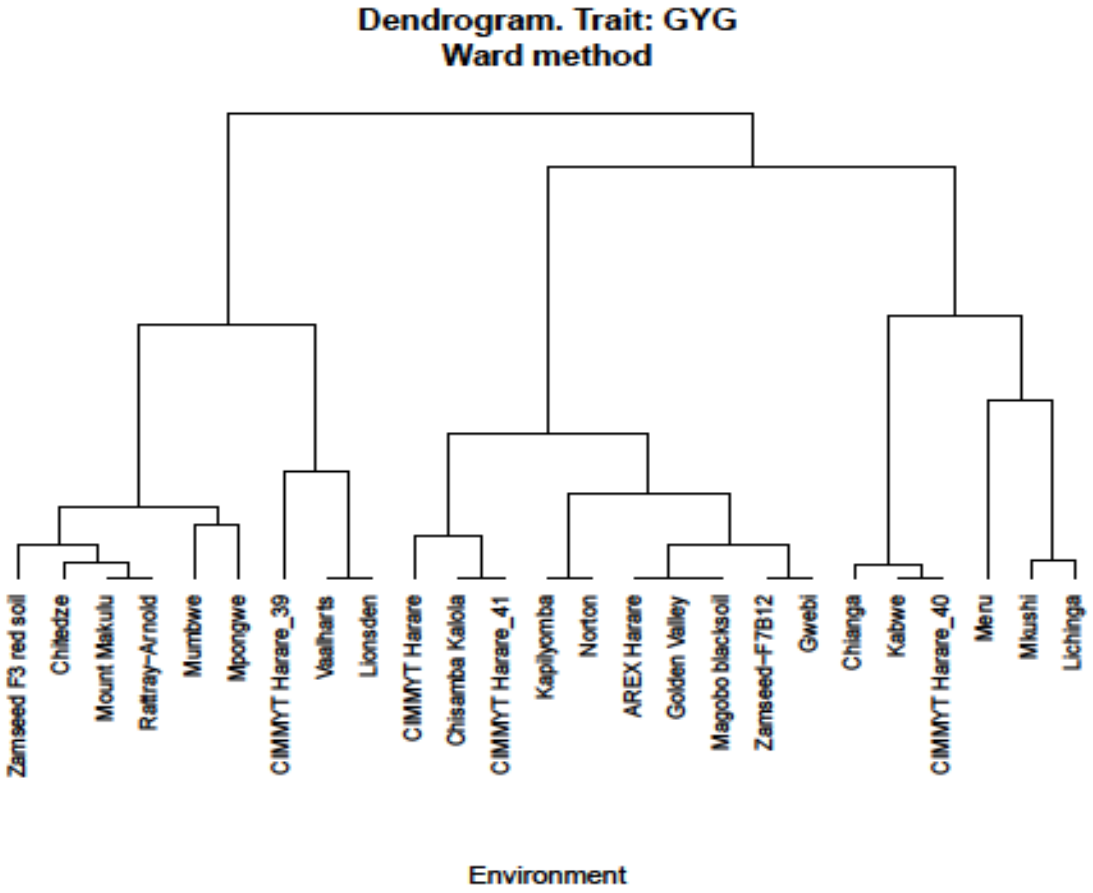
# IHYB23 Site Heritabilities

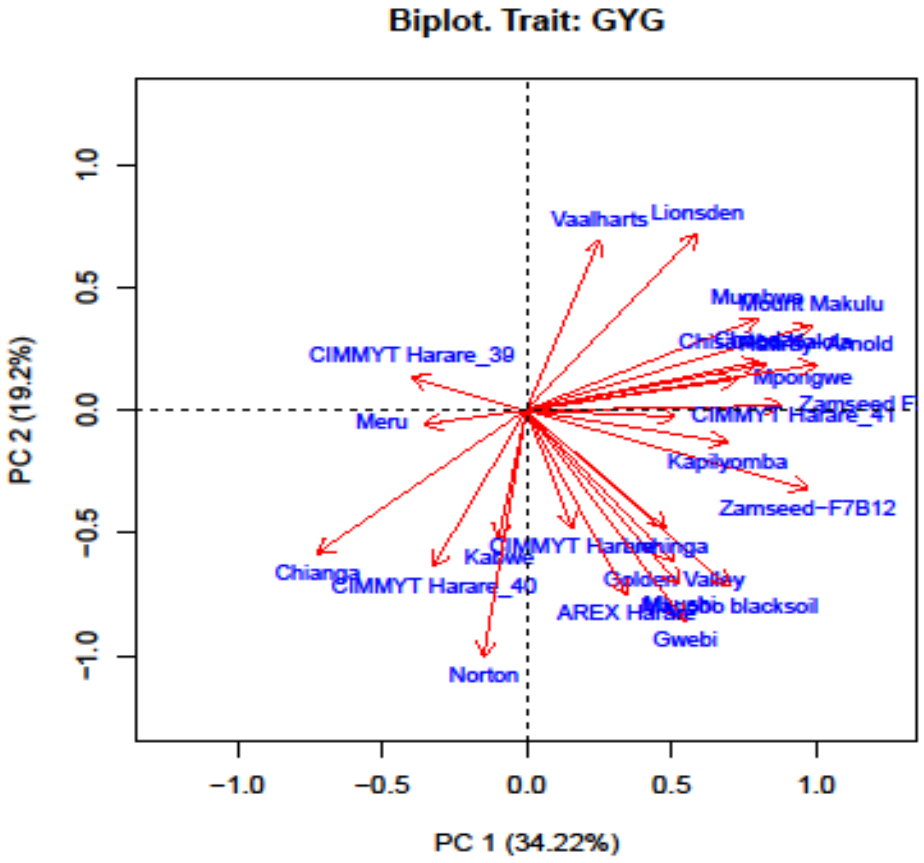
| Environment/ Site | Genotype Variance | Residual Variance | GYG_Heritability |
|---|---|---|---|
| AREX Harare | 0.089 | 2.082 | 0.14 |
| Chianga | 0.554 | 1.72 | 0.49 |
| Chisamba Kalola | 0.598 | 0.7 | 0.72 |
| Chitedze | 1.994 | 1.464 | 0.80 |
| CIMMYT Harare | 0.27 | 0.176 | 0.75 |
| CIMMYT Harare_39 | 1.378 | 1.106 | 0.79 |
| CIMMYT Harare_40 | 0.45 | 3.604 | 0.73 |
| CIMMYT Harare_41 | 0.791 | 3.822 | 0.93 |
| Golden Valley | 0.367 | 1.503 | 0.42 |
| Gwebi | 0.246 | 1.108 | 0.40 |
| Kabwe | 0.226 | 2.596 | 0.21 |
| Kapilyomba | 1.255 | 2.389 | 0.61 |
| Lichinga | 0.863 | 0.606 | 0.81 |
| Lionsden | 2.242 | 1.294 | 0.84 |
| Magobo blacksoil | 0.7 | 1.008 | 0.68 |
| Meru | 0.274 | 1.199 | 0.41 |
| Mkushi | 0.767 | 1.528 | 0.60 |
| Mount Makulu | 0.416 | 1.514 | 0.45 |
| Mpongwe | 1.838 | 1.452 | 0.79 |
| Mumbwe | 1.575 | 1.209 | 0.80 |
| Norton | 0.161 | 1.307 | 0.27 |
| Rattray-Arnold | 1 | 0.517 | 0.85 |
| Vaalharts | 0.16 | 2.436 | 0.64 |
| Zamseed-F7B12 | 0.983 | 0.612 | 0.83 |
| Zamseed F3 red soil | 1.533 | 0.468 | 0.91 |

# IHYB23 Site Correlations

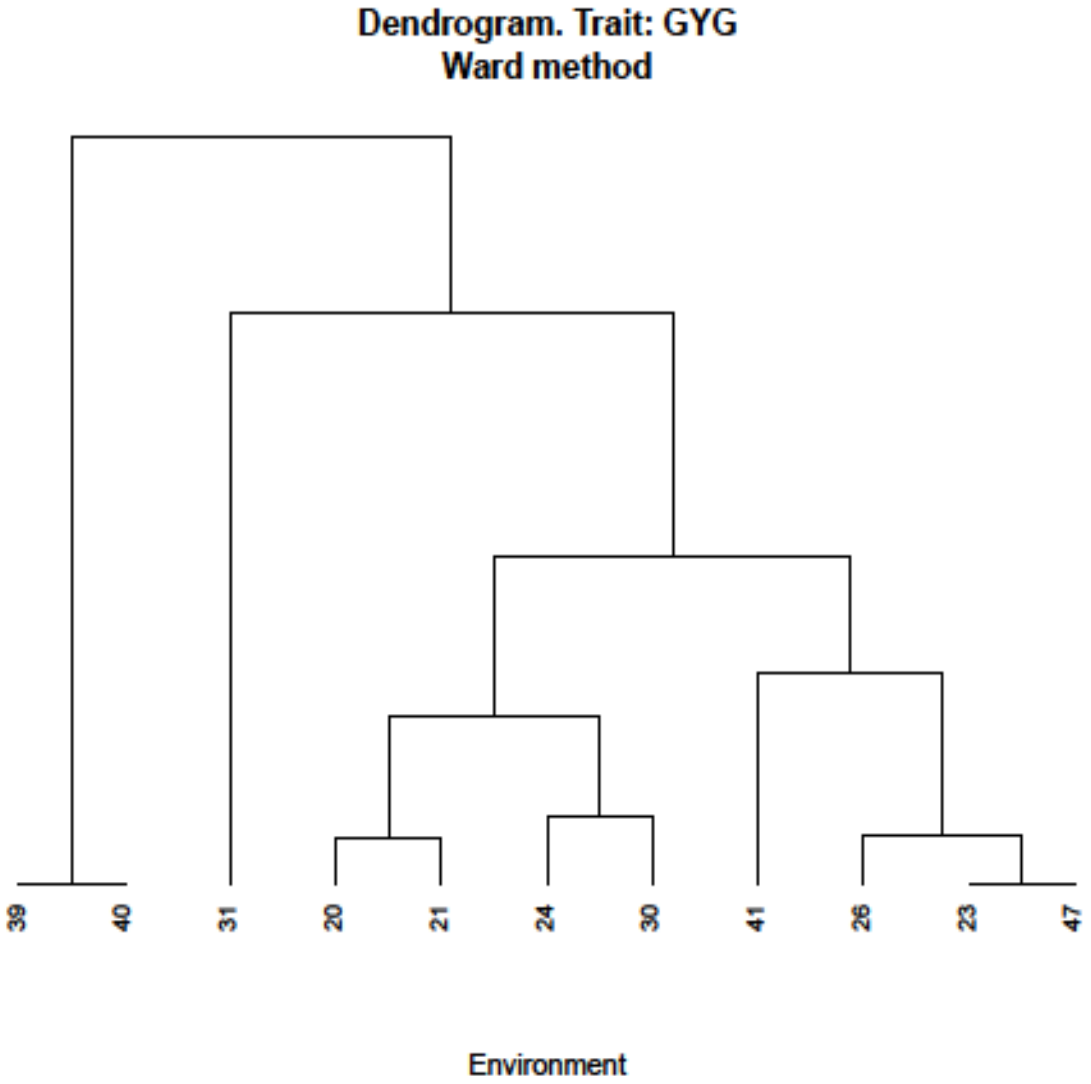
| Location | Vaalharts_7 | Vaalharts_9 | Lionsden | Golden Valley | Mumbwe | Mpongwe | Zamseed F7B12 irr blacksoil | Zamseed F3 red soil | Chisamba Kalola | Magobo blacksoil | Mkushi | Chitedze | Meru | Chianga | Lichinga | Namibie | Mbozi | CIMMYT Harare_39 | CIMMYT Harare_40 | CIMMYT Harare_41 | Rattray-Arnold | Easiseeds | DR&SS Harare |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vaalharts_7 | 1 | | | | | | | | | | | | | | | | | | | | | | |
| Vaalharts_9 | 0.4098 | 1 | | | | | | | | | | | | | | | | | | | | | |
| Lionsden | 0.7996 | 0.8477 | 1 | | | | | | | | | | | | | | | | | | | | |
| Golden Valley | 0.2322 | 0.0455 | 0.5127 | 1 | | | | | | | | | | | | | | | | | | | |
| Mumbwe | 0.5137 | 0.1673 | 0.884 | 0.5383 | 1 | | | | | | | | | | | | | | | | | | |
| Mpongwe | 0.2852 | 0.5095 | 0.9865 | 0.5377 | 0.7582 | 1 | | | | | | | | | | | | | | | | | |
| Zamseed F7B12 irr blacksoil | 0.2069 | 0.6698 | 0.3774 | 0.6218 | 0.4806 | 0.7124 | 1 | | | | | | | | | | | | | | | | |
| Zamseed F3 red soil | 0.3826 | 0.3558 | 0.5989 | 0.3272 | 0.3433 | 0.525 | 0.9298 | 1 | | | | | | | | | | | | | | | |
| Chisamba Kalola | 0.5752 | 0.7243 | 0.665 | 0.7531 | 0.6646 | 0.9999 | 0.9387 | 0.4362 | 1 | | | | | | | | | | | | | | |
| Magobo blacksoil | 0.0523 | 0.4752 | 0.1765 | 0.4346 | 0.4828 | 0.8822 | 0.5989 | 0.4445 | 0.8164 | 1 | | | | | | | | | | | | | |
| Mkushi | 0.2875 | 0.213 | 0.9869 | 0.48 | 0.8365 | 0.5949 | 0.552 | 0.4834 | 0.9093 | 0.649 | 1 | | | | | | | | | | | | |
| Chitedze | 0.1017 | 0.6071 | 0.9415 | 0.2034 | 0.9999 | 0.4376 | 0.9999 | 0.9285 | 0.9999 | 0.6252 | 0.9725 | 1 | | | | | | | | | | | |
| Meru | 0.3641 | 0.1476 | 0.3625 | 0.4191 | 0.4108 | 0.654 | 0.3709 | 0.6857 | 0.673 | 0.5714 | 0.4116 | 0.9999 | 1 | | | | | | | | | | |
| Chianga | 0.7158 | 0.2681 | 0.383 | 0.0508 | 0.5678 | 0.3851 | 0.3966 | 0.2993 | 0.0951 | 0.5106 | 0.5377 | 0.8719 | 0.0068 | 1 | | | | | | | | | |
| Lichinga | 0.3916 | 0.249 | 0.9999 | 0.1702 | 0.4867 | 0.1253 | 0.4252 | 0.223 | 0.2862 | 0.6464 | 0.6666 | 0.9999 | 0.3917 | 0.4365 | 1 | | | | | | | | |
| Namibie | 0.7849 | 0.0675 | 0.0239 | 0.0515 | 0.2015 | 0.186 | 0.484 | 0.0889 | 0.6524 | 0.2683 | 0.3176 | 0.1897 | 0.2881 | 0.3843 | 0.3087 | 1 | | | | | | | |
| Mbozi | 0.4601 | 0.6925 | 0.9999 | 0.4981 | 0.6783 | 0.7735 | 0.9999 | 0.7888 | 0.9999 | 0.6095 | 0.9269 | 0.9999 | 0.8669 | 0.3344 | 0.4339 | 0.0116 | 1 | | | | | | |
| CIMMYT Harare_39 | 0.8453 | 0.3648 | 0.9999 | 0.041 | 0.2895 | 0.6431 | 0.8311 | 0.5458 | 0.3808 | 0.5928 | 0.3753 | 0.7012 | 0.2623 | 0.7152 | 0.3095 | 0.5769 | 0.6411 | 1 | | | | | |
| CIMMYT Harare_40 | 0.1436 | 0.2106 | 0.1571 | 0.1545 | 0.2545 | 0.3892 | 0.5924 | 0.4467 | 0.0633 | 0.4431 | 0.5008 | 0.5686 | 0.0936 | 0.7846 | 0.4485 | 0.2783 | 0.0025 | 0.9999 | 1 | | | | |
| CIMMYT Harare_41 | 0.5397 | 0.3273 | 0.4208 | 0.2621 | 0.0039 | 0.064 | 0.1889 | 0.1482 | 0.1697 | 0.2008 | 0.2424 | 0.4732 | 0.1094 | 0.6012 | 0.4731 | 0.005 | 0.2124 | 0.7154 | 0.7787 | 1 | | | |
| Rattray-Arnold | 0.6709 | 0.2306 | 0.0256 | 0.3123 | 0.2382 | 0.4732 | 0.7522 | 0.5288 | 0.3705 | 0.7227 | 0.3475 | 0.312 | 0.0269 | 0.6687 | 0.555 | 0.8352 | 0.3507 | 0.9815 | 0.7212 | 0.3878 | 1 | | |
| Easiseeds | 0.901 | 0.4316 | 0.9999 | 0.4654 | 0.9374 | 0.6232 | 0.6525 | 0.0529 | 0.8301 | 0.1414 | 0.8929 | 0.9999 | 0.6746 | 0.0181 | 0.8657 | 0.3986 | 0.6796 | 0.2771 | 0.0659 | 0.2901 | 0.1913 | 1 | |
| DR&SS Harare | 0.1555 | 0.1607 | 0.0098 | 0.7424 | 0.5873 | 0.6119 | 0.9329 | 0.4614 | 0.5354 | 0.5703 | 0.7641 | 0.8478 | 0.5756 | 0.3902 | 0.7189 | 0.0414 | 0.9999 | 0.6267 | 0.6017 | 0.2334 | 0.4731 | 0.0914 | 1 |

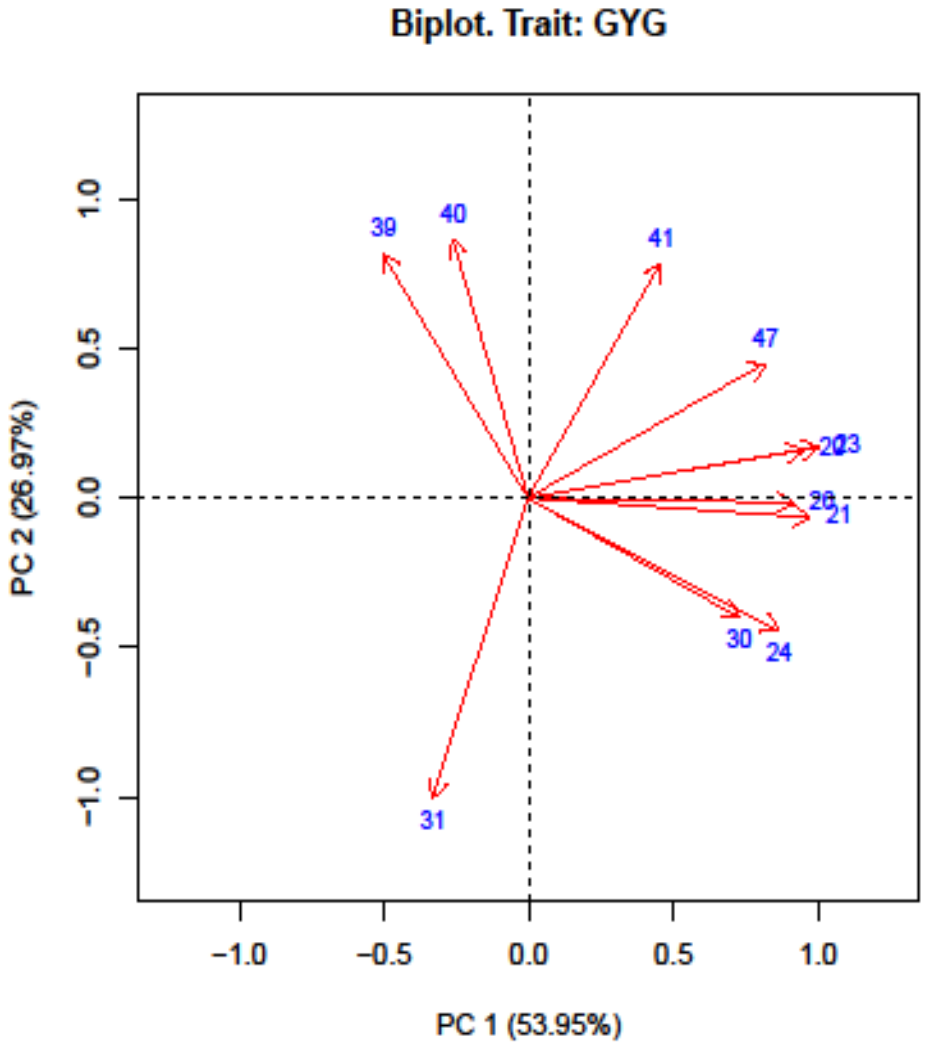
# IHYB23 Grain Yield for ALL Sites



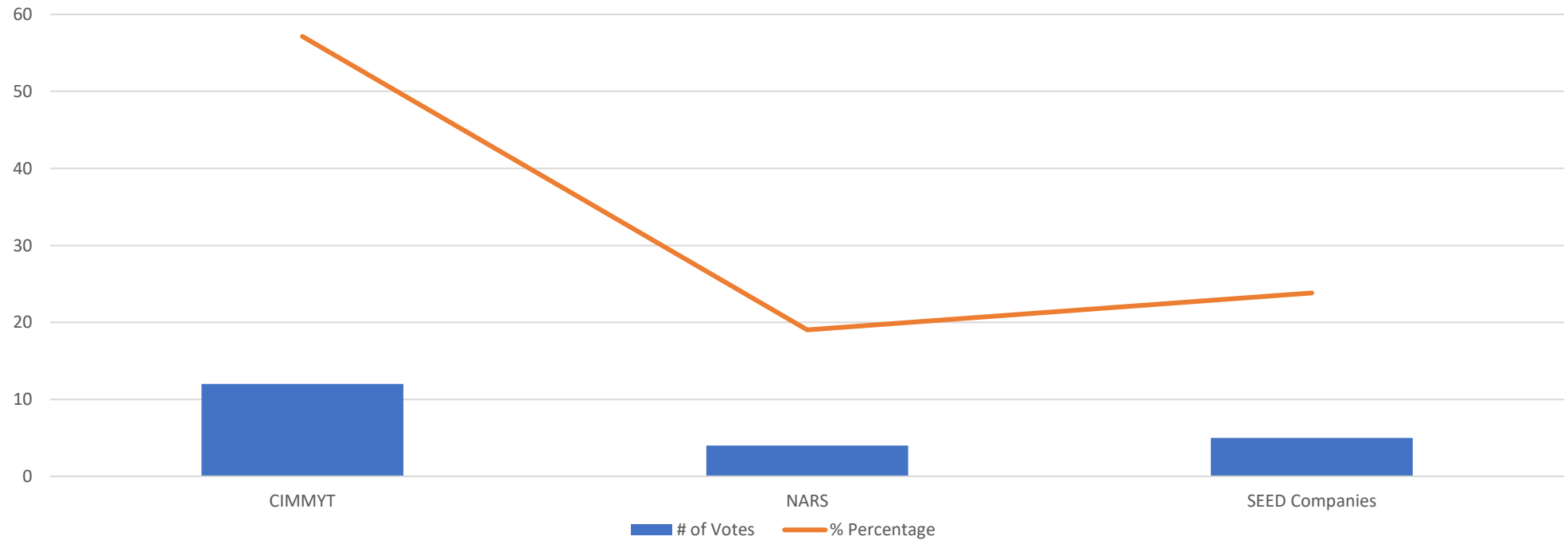
# IHYB23 Grain Yield Biplot for Optimal Sites



# CIMMYT and Partner Vote Contributions

| Organisation | # of Votes | % Percentage |
|---|---|---|
| CIMMYT | 12 | 57.1 |
| NARS | 4 | 19.0 |
| SEED Companies | 5 | 23.8 |



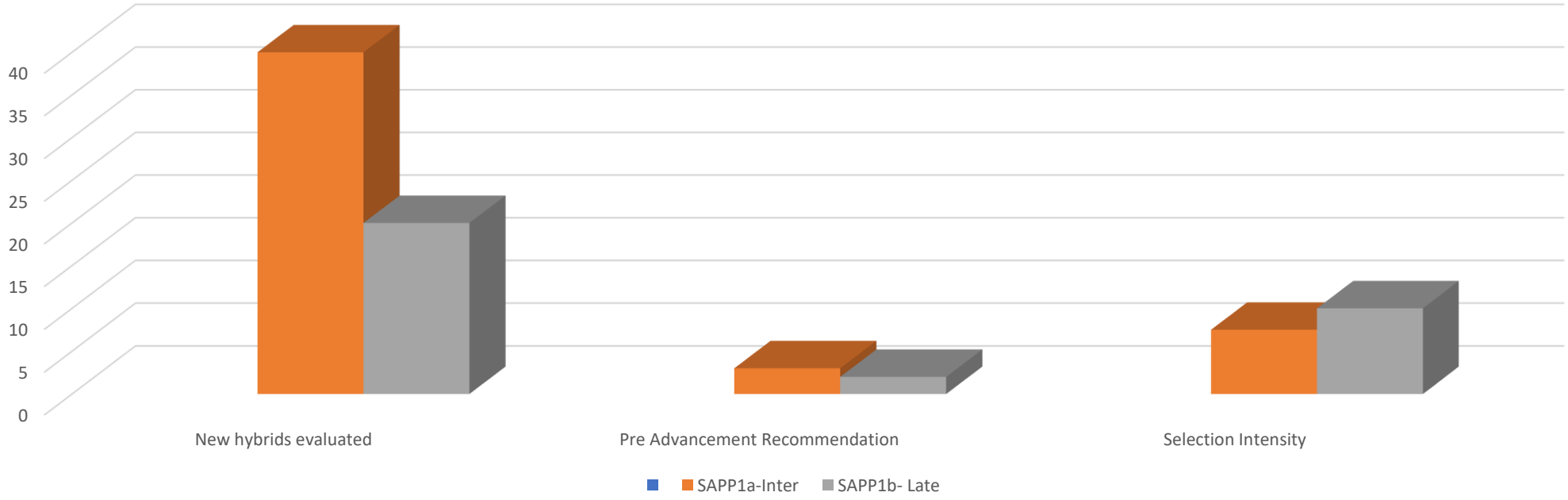
# Hybrid Voting or Selection Procedure

Production Constraints : **Essential** or **must have** traits for Southern Africa

- Grain yield under Optimal, Low N and Managed Drought conditions
- Maturity for both AD and Moisture
- Standability, Ear Rots and Husk Cover
- Foliar Diseases: MSV, TLB, GLS and Rust
- Hybrid seed producibility and QA/AC of Parents
- Nicking or Synchronization between FP (SX) and PP
- Yields of both **FP** and **PP** should have a threshold of 4.5t/ha and 1.5t/ha respectively

# CIMMYT New Hybrids Vs Pre-Advancement Selection

| Target Production Profile | New Hybrids Evaluated | Pre - Advancement Recommendation | Selection Intensity |
|---|---|---|---|
| | | | |
| SAPP1a-Inter | 40 | 3 | 7.5 |
| SAPP1b- Late | 20 | 2 | 10 |



# Thank you for your interest!

CIMMYT

CGIAR