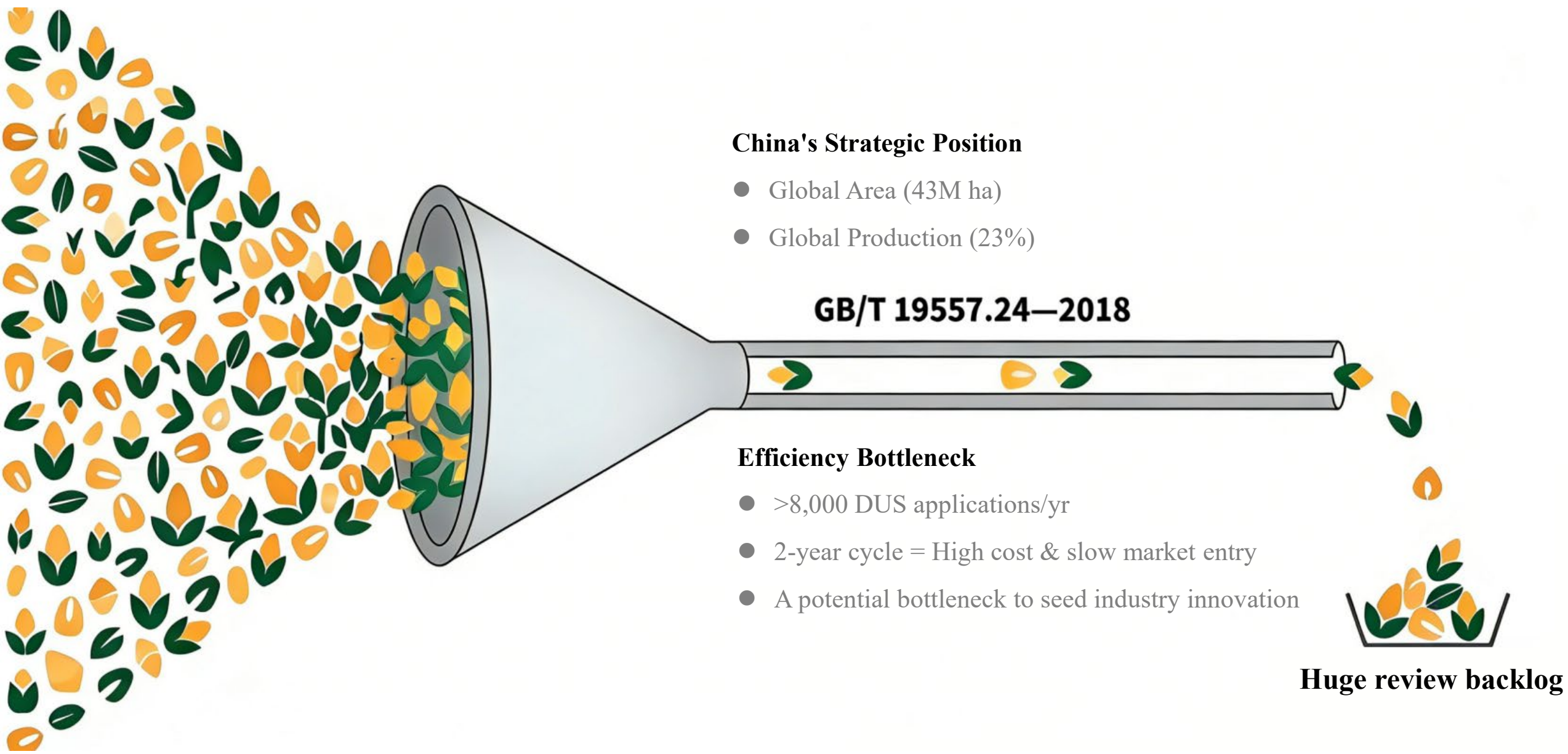


Evaluation of Spatio-temporal Consistency in Maize DUS Traits

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April 21 2026



China's Strategic Position

- Global Area (43M ha)
- Global Production (23%)

GB/T 19557.24—2018

Efficiency Bottleneck

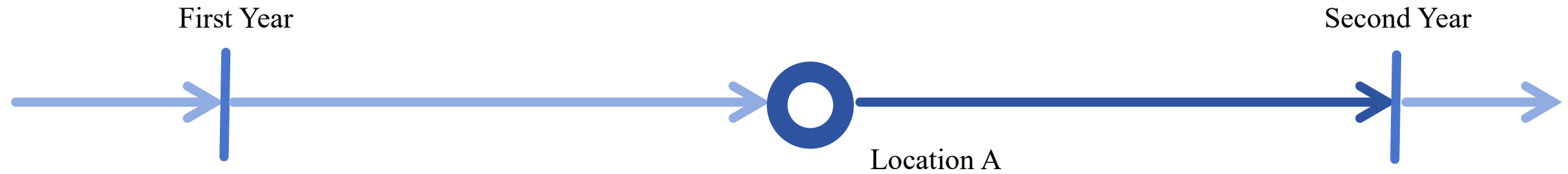
- >8,000 DUS applications/yr
- 2-year cycle = High cost & slow market entry
- A potential bottleneck to seed industry innovation

Huge review backlog

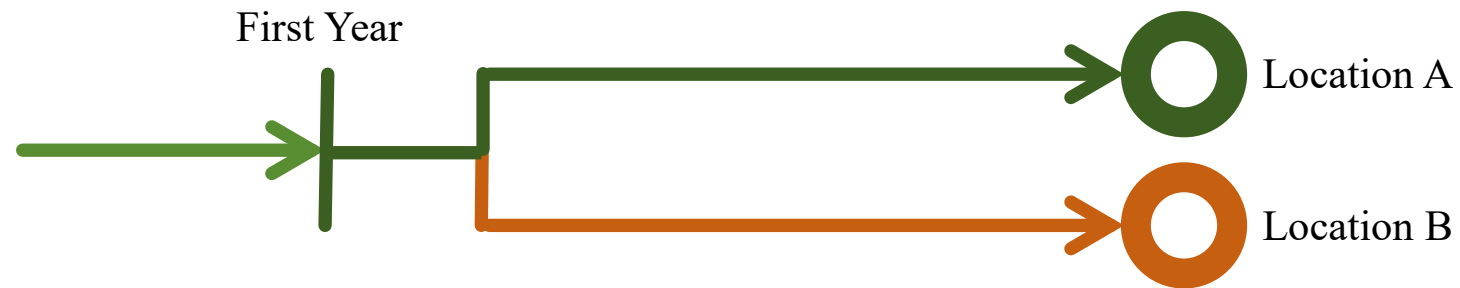
UPOV (TG/1/3)
GB/T 19557.24-2018

At least two independent growing cycles

One Location, Two Years (1L2Y): 24 months



One Year, Two Locations (1Y2L): 12 months





Datong
113°27' E, 39°92' N
(2025)

Xinzhou
112°73' E, 38°42' N
(2024-2025)

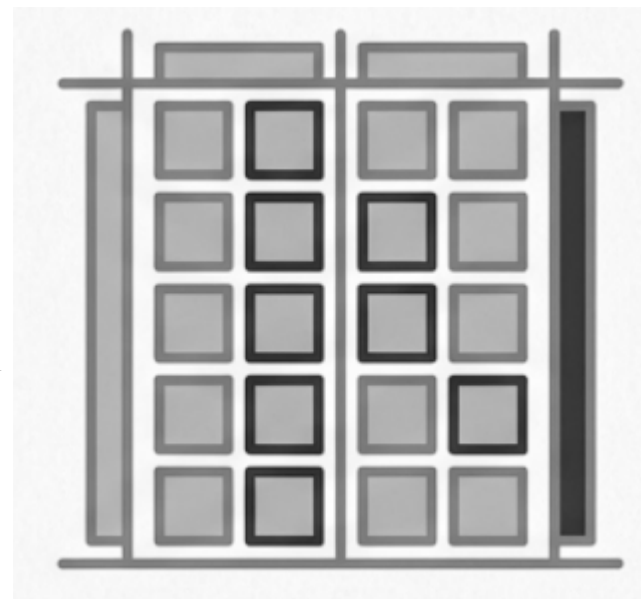
117 maize genotypes

- 21 inbred lines
- 96 hybrids
- 39 characteristics (12 Quantitative Traits)



Statistical Analysis

- Coefficient of Variation (CV) Analysis (SPSS)
- Principal Component Analysis (PCA) (SPSS)
- UPGMA Cluster Analysis (Origin)

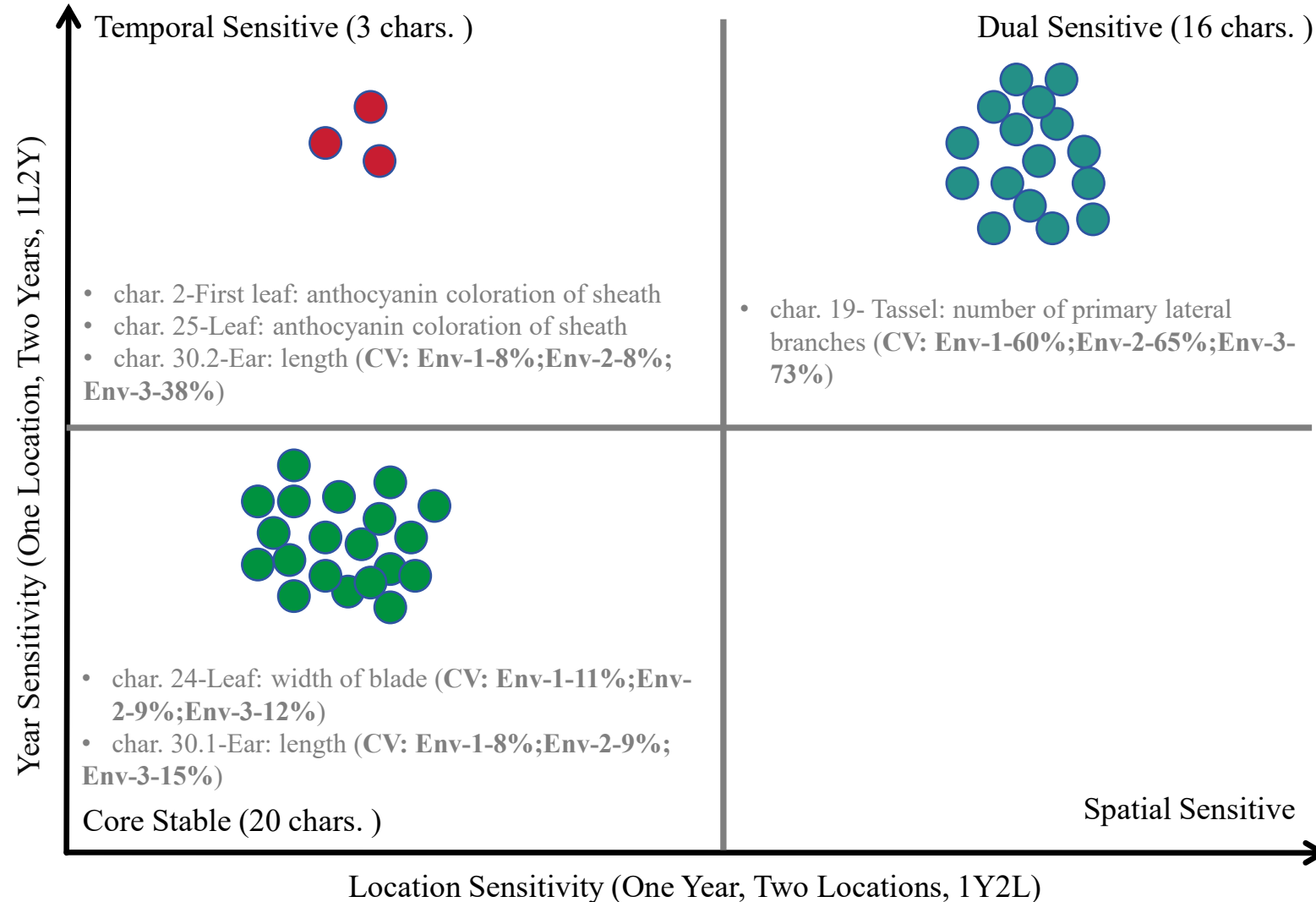


Randomized Block Design

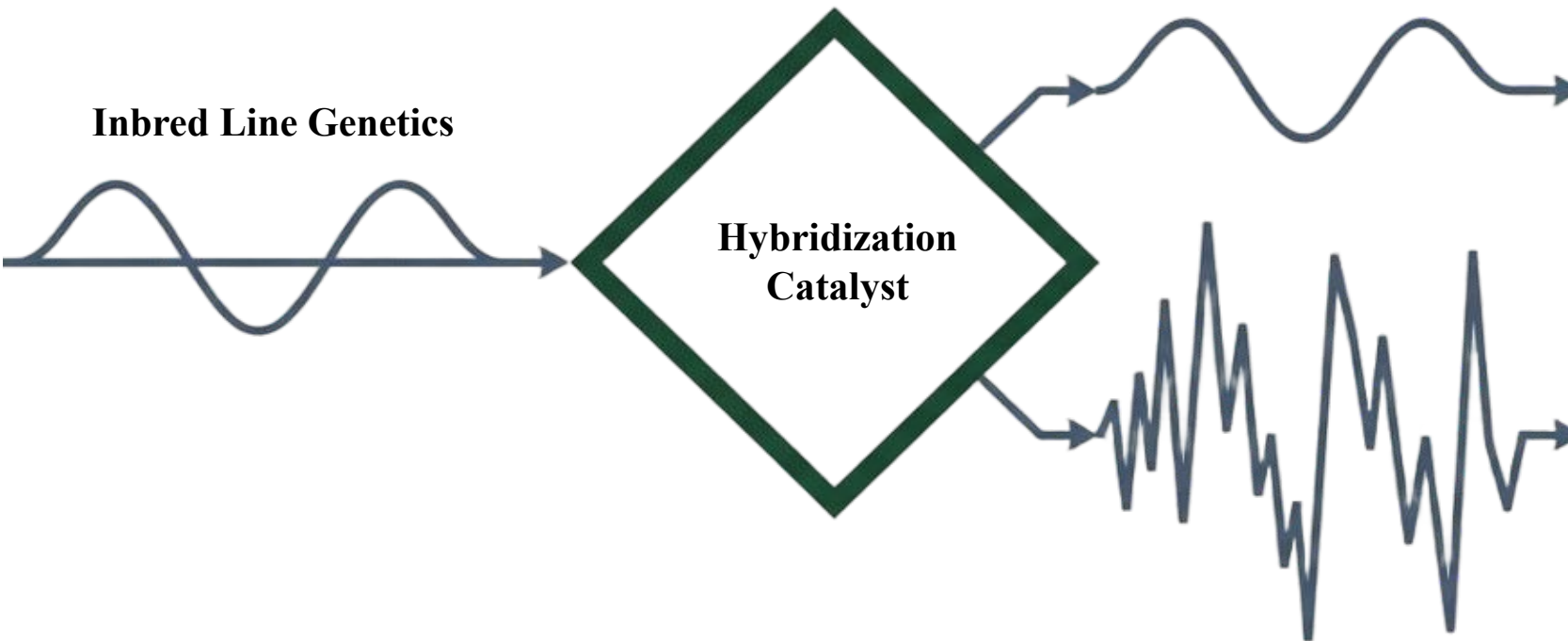
Table 1 Environmental description of the experimental site

Environment	Sowing Date	Harvest Date	Average Altitude (m)	Annual Average Temperature (°C)	Annual Average Precipitation (mm)	Annual Sunshine Hours (h)	Soil Property	Previous Crop
Env-1 2025 Xinzhou	2025/4/26	2025/9/24	800m	10.1	442	2305	Loam	Maize
Env-2 2025 Datong	2025/5/15	2025/10/8	1040m	6.7	408	2765	Sandy Loam	Foxtail Millet
Env-3 2024 Xinzhou	2024/4/30	2024/10/1	800m	10.0	445	2290	Loam	Maize

Result: Coefficient of Variation (CV) Analysis



Result: Coefficient of Variation (CV) Analysis



Phenotypic Canalization Maintained

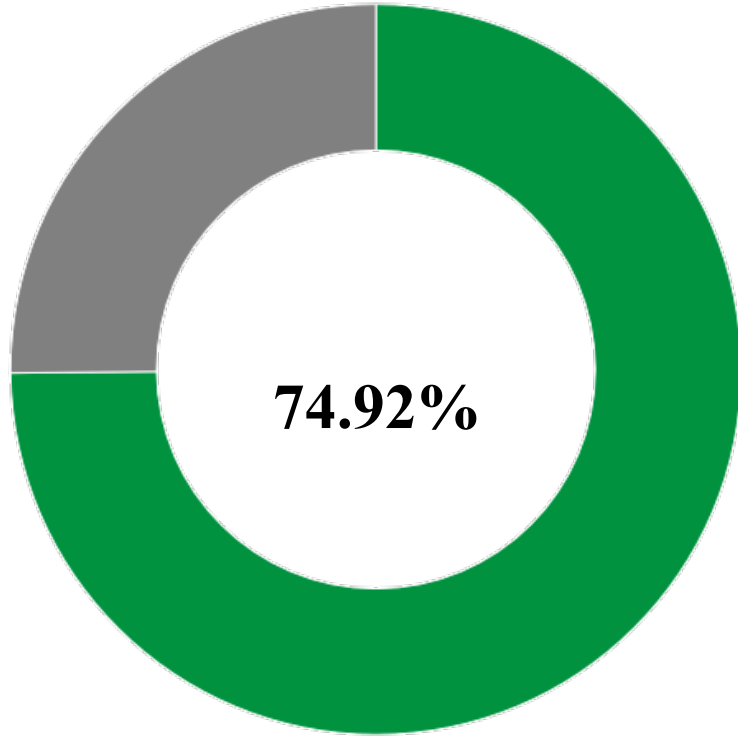
Char. 18 (Tassel: Length of main axis above highest lateral branch) and Char. 23 (Leaf blade length) remain stable in both inbreds and hybrids.

The Amplification Effect

Char. 27 (Plant height) is highly stable in inbreds; in hybrids, volatility explodes. Char. 32 (number of rows of grain) follows identical patterns.

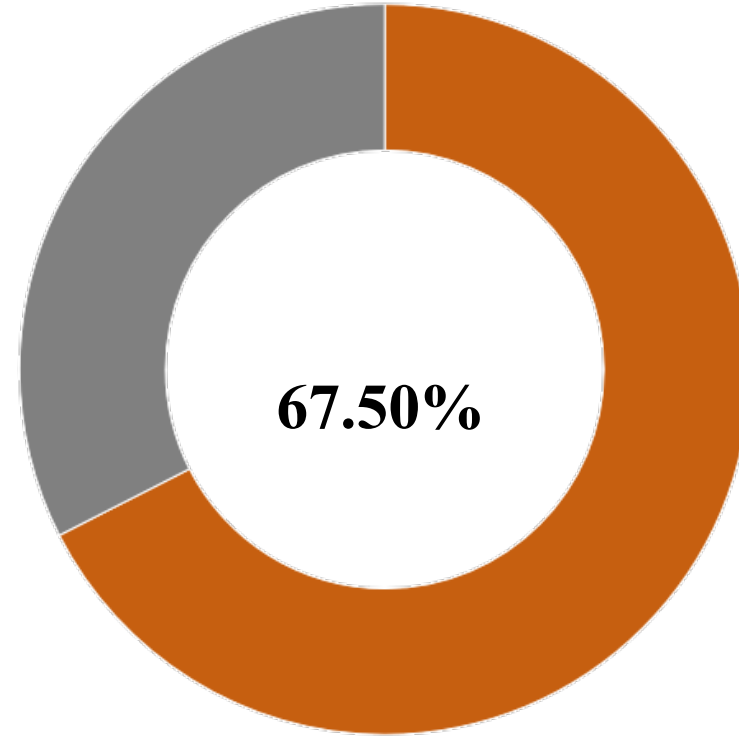
Genetic recombination acts as a multiplier for environmental sensitivity.

Result: Principal Component Analysis (PCA)



1Y2L

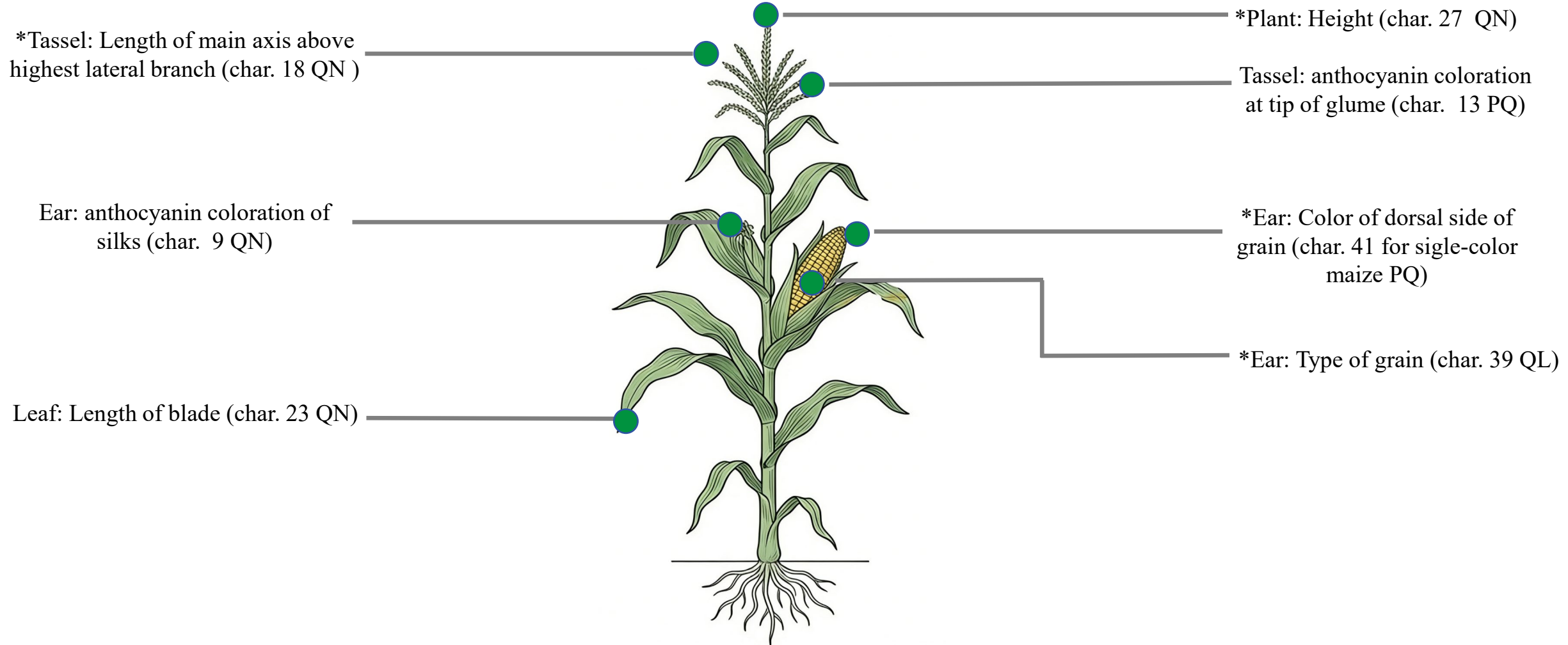
Cumulative variance contribution of first 12 components in spatial dimension (**Eigenvalue**>1)



1L2Y

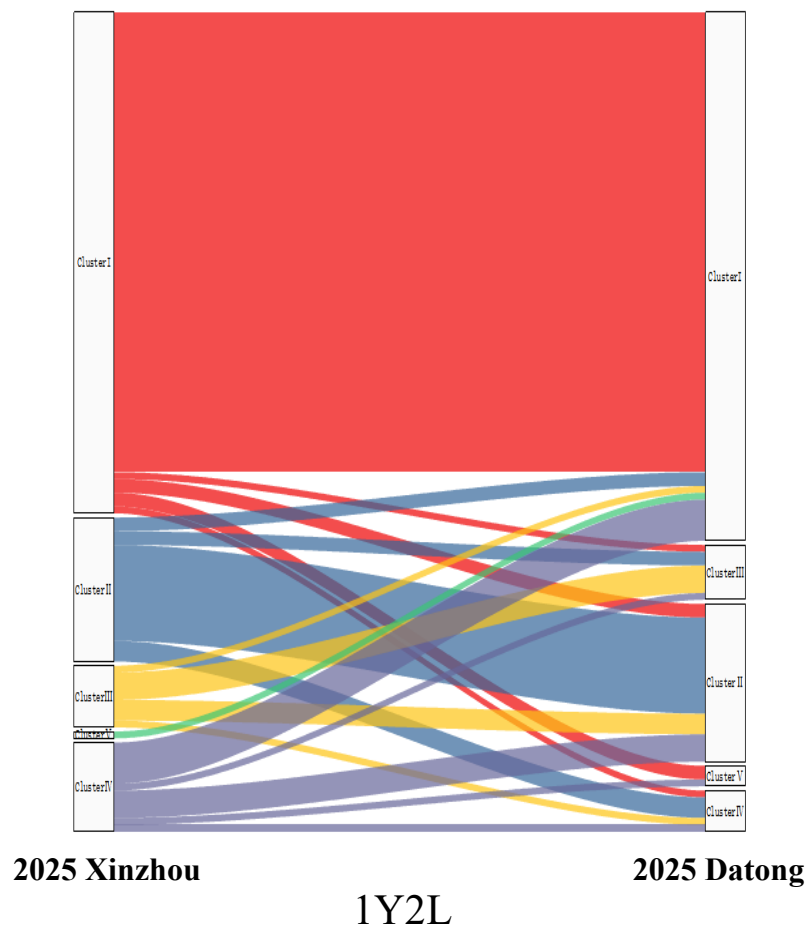
Cumulative variance contribution of first 11 components in temporal dimension (**Eigenvalue**>1)

Result: Principal Component Analysis (PCA)

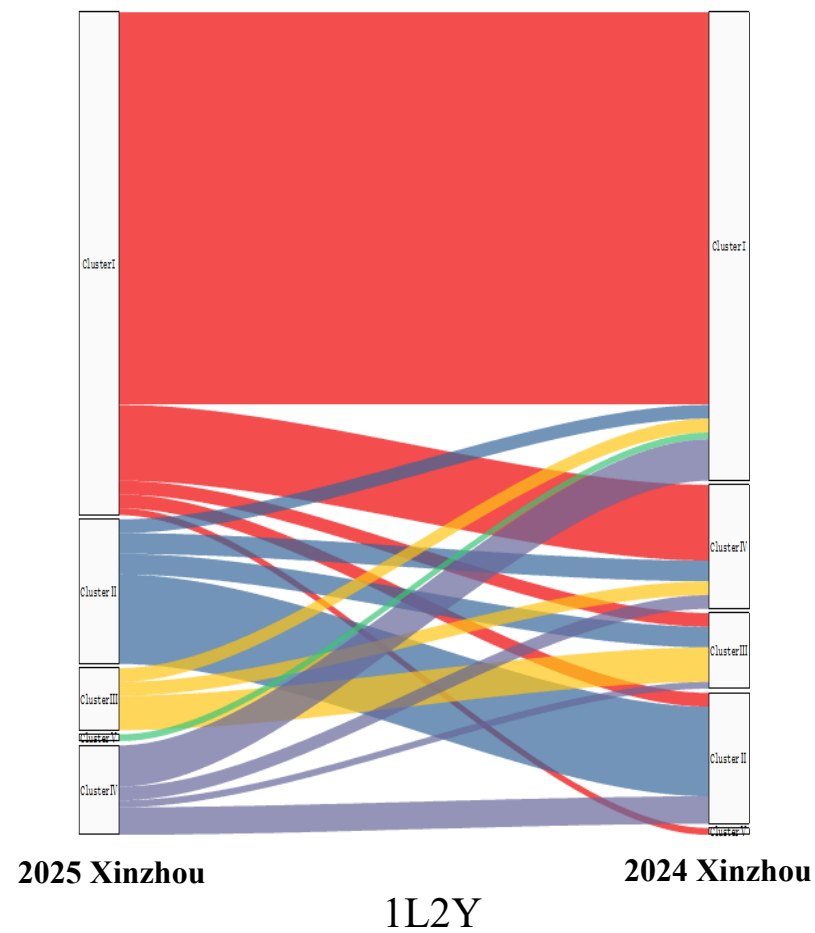


Seven core traits capture nearly 75% of the inter-varietal variation.

Result: UPGMA Cluster Analysis



Clustering Retention (CR) rate: 92.31%



Clustering Retention (CR) rate: 94.87%

Result: Validation & Consistency (106 genotypes)



2025 Xinzhou 2024 Xinzhou

1L2Y

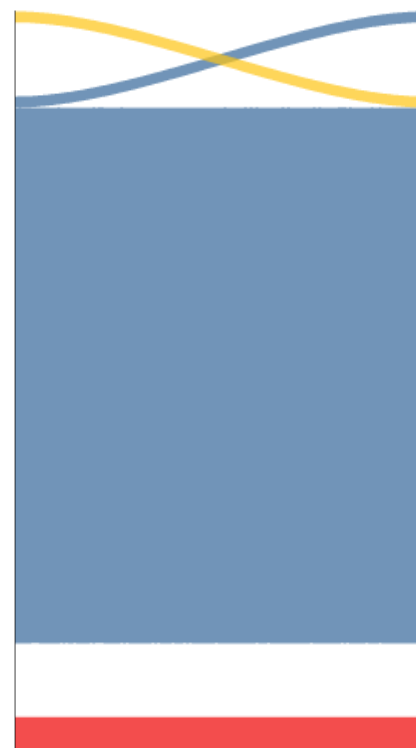
Distinctness: 86.7% vs 94.36%



2025 Xinzhou 2025 Datong

1Y2L

86.79%

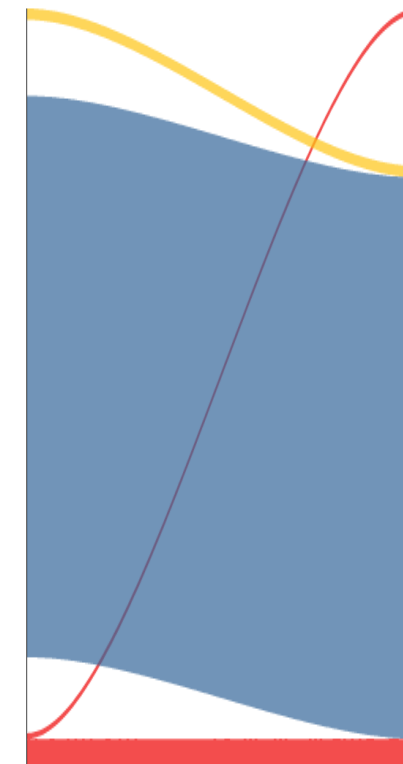


2025 Xinzhou 2024 Xinzhou

1L2Y

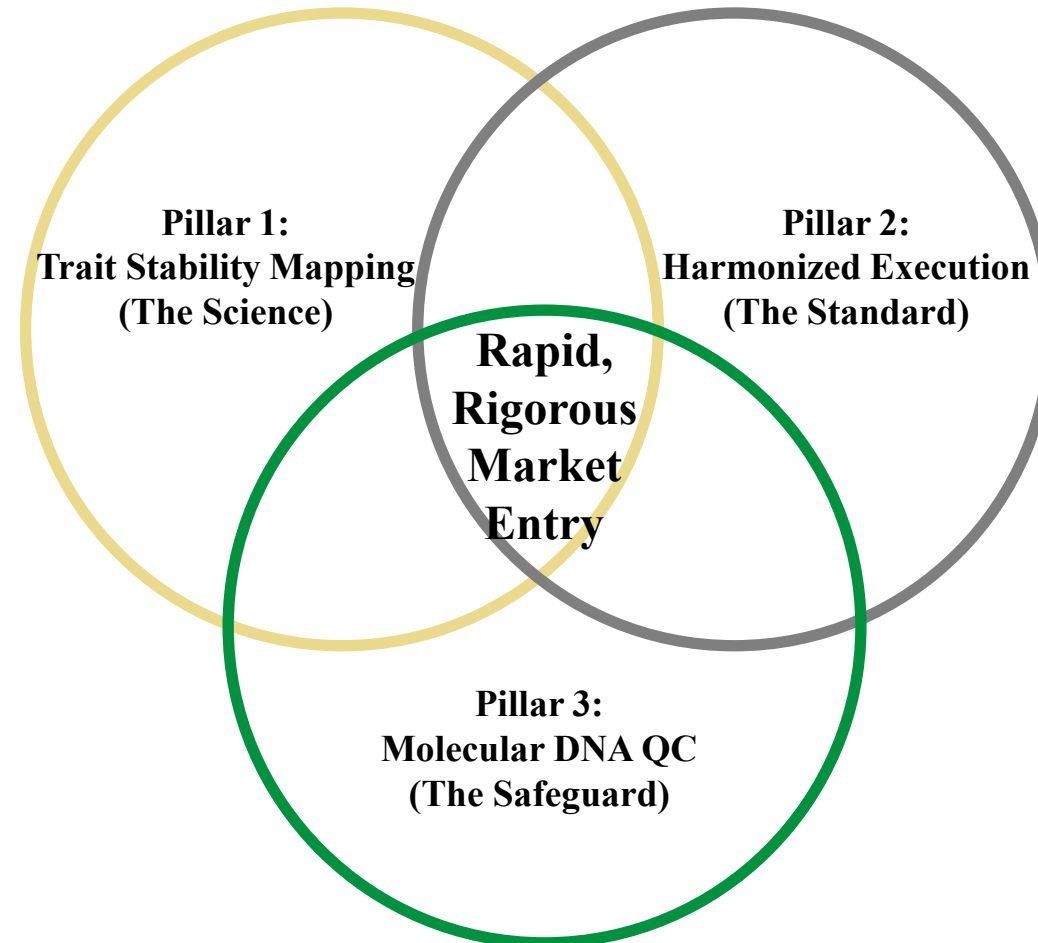
Uniformity: 93.40% vs 96.23%

83.02%



2025 Xinzhou 2025 Datong

1Y2L



The 1Y2L model is far more than simply planting in two locations; it is a sophisticated paradigm that focuses on environment-insensitive stable traits, utilizes example varieties for standardized calibration, and relies on the robustness of the variety's holistic phenotypic framework



**THANK YOU FOR
YOUR
ATTENTION!**

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