Supplementary Materials

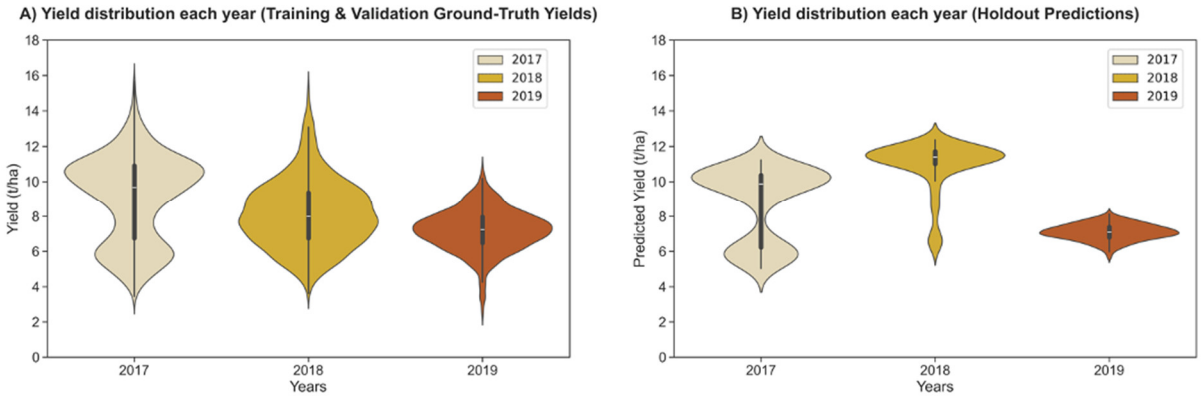
Supplementary Table S1. Dates of images taken, sowing dates and fertiliser application used for each environment per year.

Year	Treatment	Dates of Images Taken (Day-Month-Year)	Date Planted (Day-Month-Year)	Fertiliser Application
2017	DG2F	06-04-2017 & 09-05-2017	03-03-2017	43 gallons per acre of 32:0:0
	G2LA	09-05-2017 & 08-06-2017	06-04-2017	70 gallons per acre of 32:0:0
	G2FE	06-04-2017 & 09-05-2017	03-03-2017	70 gallons per acre of 32:0:0
2018	G2FN	11-04-2018 & 15-05-2018	07-03-2018	Information not available from dataset.
	G2LA	15-05-2018 & 13-06-2018	03-04-2018	Information not available from dataset.
	G2FE	11-04-2018 & 15-05-2018	08-03-2018	Information not available from dataset.
2019	DG2F	20-04-2019 & 23-05-2019	20-03-2019	75 gallons per acre of 32:0:0
	G2LA	20-04-2019 & 23-05-2019	20-03-2019	75 gallons per acre of 32:0:0
	G2F1	20-04-2019 & 23-05-2019	20-03-2019	75 gallons per acre of 32:0:0

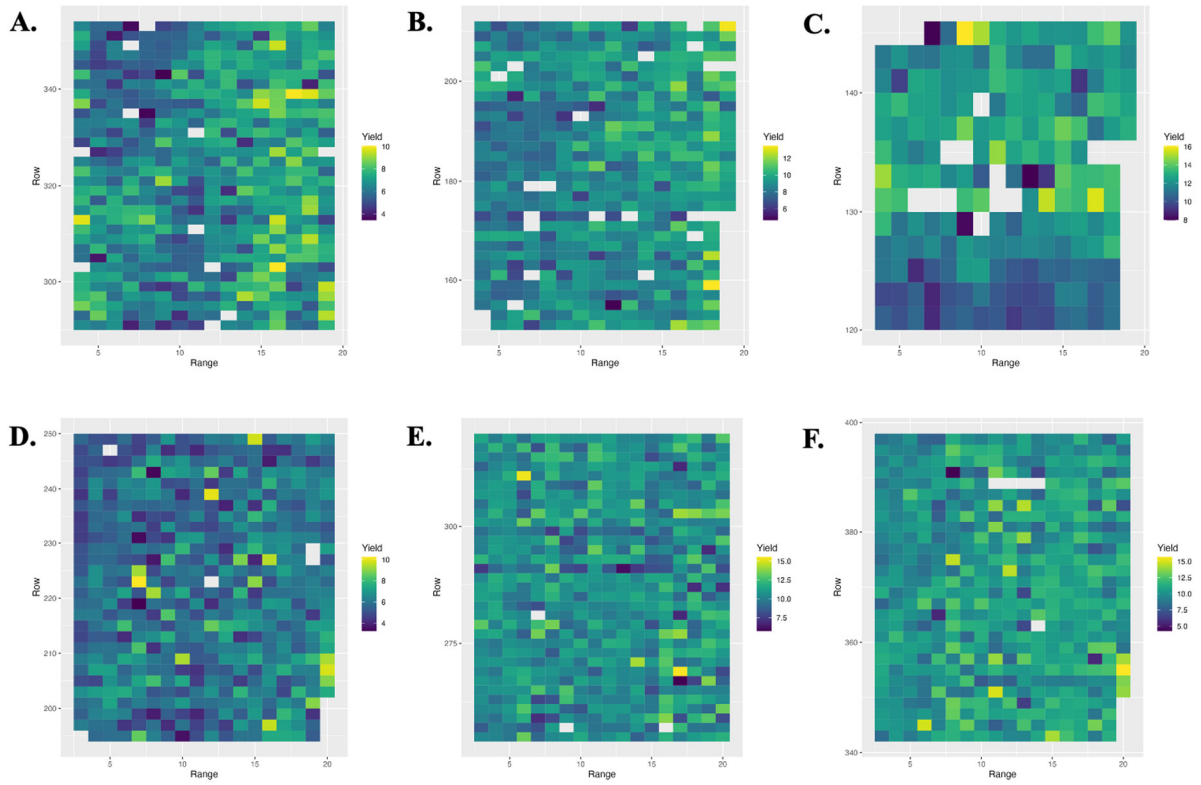
Supplementary Table S2. Features used for the Tabular DNN model. Descriptions extracted from the README.txt file of the G2F dataset.

Name	Type	Description
Pedigree1	Categorical	Hybrid pedigree lineage of plot.
Pedigree2		Hybrid pedigree lineage of plot.
Stock		Seed source.
Test		Name abbreviation of the environment tested.
JulianPlantDatePerYear	Numerical	To standardise the sowing dates, the Julian date was calculated for each plant per year.
Year		The year the plant was sown and harvested.
DTA: Days to anthesis (days)		Number of days after planting date until 50% anther dehiscence of respective plot.
DTS: Days to silking (days)		Number of days after planting date until 50% silk emergence of respective plot.
Moist (%)		Percentage grain moisture level as measured by the combine.
Population (plants/acre)		Plant population density.
Range		Range arrangement of the hybrid within the field trial.
Row		Row arrangement of the hybrid within the field trial.
T2MDEW (ºC)		Dew/Frost Point at 2 Meters. Summed Weekly.
RH2M (%)		Relative Humidity at 2 Meters. Averaged Weekly.
WS2M (m/s)		Wind Speed at 2 Meters. Summed Weekly.
ALLSKY_SFC_SW_DWN (MJ/m^2/day)		All Sky Surface Shortwave Downward Irradiance. This feature measures the total solar energy received over the earth's surface

	across the shortwave spectrum spanning between 0.3–3.0 µm, and under all-sky conditions [42]. Summed Weekly.
T2M_MAX (ºC)	Maximum Temperature at 2 Metres. Averaged Weekly.
T2M_DIFF_SUM (ºC)	Difference between the Maximum and Minimum Temperature at 2 Metres. Summed Weekly.
T2M_GDD (heat units)	Growing degree-days (GDD) equation calculates a heat value for a specific day [43]. Captures information such as plant growth in relation to temperature [43]. The base temperature of maize is ~10ºC, which is subtracted in the equation [44,45]. Summed Weekly. Equation = (T2M_MAX + T2M_MIN)/2) – Base Temperature (10ºC)
T2M_MIN (ºC)	Minimum Temperature at 2 Metres. Averaged Weekly.
PRECTOTCORR (mm/day)	Precipitation Corrected. Summed Weekly.



Supplementary Figure S1. Yield distribution for each year for (**A**) the ground-truth yields during training and validation, and (**B**) the holdout predictions generated from the multimodal deep learning model (training from scratch).



Supplementary Figure S2. Yield variability between specific crop locations within environments per year. (**A**) represents G2LA hybrids sown in 2018. (**B**) represents G2FE hybrids sown in 2018. (**C**) represents G2FN hybrids sown in 2018. (**D**) represents G2LA hybrids sown in 2017. (**E**) represents G2FE hybrids sown in 2017. (**F**) represents DG2F hybrids sown in 2017.