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Genetic Variability, Correlation and Path Analysis of Agronomic Traits and Yield Components of Thai Sweet Corn

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ABSTRACT

Background: Genetic variability assessment is essential for breeding programs aimed at improving desirable traits. This research aimed i) to evaluate the genetic variability, correlations and path coefficients of agronomic traits and yield components in Thai sweet corn and ii) to identify cultivars best suited to the climate of Nakhon Si Thammarat in Southern Thailand.

Methods: Ten cultivars of Thai commercial sweet corn were evaluated for genetic variability using three blocks of a completely randomized block design. Analyses included genetic variability, correlation coefficients and path analysis.

Result: The findings indicated significant differences in most agronomic traits and yield components among the cultivars. The genetic variability analysis revealed that all traits had higher phenotypic coefficient of variation than genotypic coefficient of variation. Stem height, days to male and female flowering and rows per ear demonstrated moderate heritability, with stem diameter and rows per ear showing moderate heritability and genetic advance as a percentage of the mean. The correlation coefficient and path analysis revealed that stem height, leaf width, ear length and diameter and kernels per row had a positive direct effect on ear weight, with or without husk. These traits are suggested as key factors for enhancing ear weight in breeding programs. Based on yield components, the cultivars Hi-Brix 59 and Dr Pek 1351 are recommended for Nakhon Si Thammarat due to their adaptability to the local climate.

Key words: Correlation, Genetic variability, Path analysis, Thai sweet corn.

INTRODUCTION

The sweet corn, *Zea mays* L. var *saccharata*, is one of the world's most valuable grain crops and is planted worldwide in various environments. It is cultivated for varying levels of processing by the food industry, for human consumption (Chouhan *et al*., 2017; Swapna *et al*., 2020). Sweet corn contains a multitude of nutrients such as starch, sugar, water soluble polysaccharides, proteins, vitamins, zeaxanthin, lutein and carotenoids (Junpatiw *et al*., 2013). It is a major economic crop planted throughout Thailand, where it is used every day in large quantities in factories and sold every day in large quantities at fresh markets (Rachapila and Jansirisak, 2013). A total of 36,981 hectares of sweet corn have been planted across the country and a yield of 494,108 tons has been produced. Nakhon Si Thammarat Province is the second-largest producer in Southern Thailand, by planting area and yield production (Office of Agricultural Economics, 2022). Nevertheless, the investigation of sweet corn genetics and adaptation in Nakhon Si Thammarat is inadequate.

Hybrid sweet corn tends to exhibit limited genetic diversity and several undesirable traits, such as low seed emergence in field, poor seedling vigor and susceptibility to pests and diseases. Additionally, high rates of disease, insect infestations, shorter day lengths and elevated temperatures are common in tropical climates (Abe and Adelegan, 2019). The productive performance of corn hybrids is strongly influenced by both genetic and environmental factors. These factors affect the extent to which key agronomic traits correlate, ultimately impacting productive potential. Thus, evaluating the genetic variation in traits associated with crop yield is essential (Szareski *et al*., 2018). Genetic variability refers to the variations in genetic makeup between or within populations. This variability can be affected by several factors, including gene flow from population migration, crossing over or homologous recombination during meiosis, mutations and polyploidy. Understanding genetic variability is critical for improving desirable traits in breeding programs (Niji *et al*., 2018).

Correlation is a statistical method for measuring the relationship between two variables, with coefficients ranging from -1 to +1, where 0 indicates no correlation (Popet *et al*., 2022; Schober and Schwarte, 2018). Assessing correlations among traits is useful in designing and evaluating plant breeding programs, as a positive correlation between two traits implies that increasing one will likely improve the other. This insight aids in the indirect selection of a secondary characteristic to enhance a primary

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trait (Rashwan, 2011). Path analysis, a multivariate statistical technique, is used to explore potential relationships between two or more parameters. It is widely applied in plant breeding to determine the relative importance of each parameter and to differentiate between direct and indirect effects on outcomes (Bhanu *et al*., 2017; Valenzuela and Bachmann, 2017).

This research aimed i) to evaluate the genetic variability, correlations and path coefficients of agronomic traits and yield components in Thai sweet corn and ii) to identify cultivars best suited to the climate of Nakhon Si Thammarat in Southern Thailand.

MATERIALS AND METHODS

Experimental details

This investigation was conducted at the experimental field of the School of Agricultural Technology and Food Industry, located at 8°38′43.9″N 99°54′03.6″E, Walailak University. The study took place over two distinct seasons: the hot season, from February to May 2022 and the rainy season, from June to September 2022. During the experiment, the recorded rainfall ranged from 252.6 to 476.6 mm, with the highest levels observed in May. The temperature varied between 27.0 and 28.3°C, while humidity ranged from 84 to 87%. The highest humidity and lowest temperature were recorded in February and July, respectively. Weather was recorded from the experimental field's weather station and the Nakhon Si Thammarat Weather Observation Station (Meteorological Department of Thailand, 2022). Soil at a depth of 0-30 cm were as follows: pH = 5.66, organic carbon = 2.56%, cation exchange capacity = 12.15 meq 100 g^{-1}, total nitrogen = 2.45%, exchangeable potassium = 80.11 mg kg^{-1} and available phosphorus = 12.56 mg kg^{-1}. The soil type was classified as clay loam.

Ten cultivars of Thai commercial sweet corn were used as plant material in this study. The cultivars were Wan Chia Tai 1, Top Sweet 801, Chia Tai Sweet Corn, Jumbo Sweet, Super Gold, Super Honey, Bright Jean 1357, Super Sweet, Hi-Brix 59 and Dr Pek 1351. The study site was set up in three blocks with 10 treatments (one for each cultivar) using a completely randomized block design. Data were collected from fifteen plants per block. Each plot measured 1 × 10 meters, with planting holes spaced 30 cm apart and rows spaced 80 cm apart. Two corn seeds were sown in each hole and following germination, one seedling was retained. Fertilization involved the application of 3 to 5 grams of 15-15-15 and 46-0-0 (urea) fertilizers to each plant every other week after planting. Additionally, 10 grams of organic fertilizer were applied to each plant every two weeks to enhance soil structure. Water was provided via a drip irrigation system for 15 minutes at 8 am and 4 pm daily.

Data observation and analysis

Agronomic traits and yield components of corn were recorded at female flowering (50-60 days after planting) and harvest (110-120 days after planting) stages, respectively. The traits were stem diameter (SD), stem height (SH), leaf number (LN), leaf width (LW), leaf length (LL), days to male flowering (DMF) and days to female flowering (DFF). The yield components were ear length with husk (ELWH), ear diameter with husk (EDWH), ear weight with husk (EWWH), ear length without husk (ELWOH), ear diameter without husk (EDWOH), ear weight without husk (EWWOH), rows per ear (RPE) and kernels per row (KPR). Data observation followed Magar *et al*. (2021). The data were analyzed in variance, coefficient of variation (CV) (equation 1), genotypic and phenotypic coefficients of variation (GCV and PCV) (equation 2 and 3), broad-sense heritability (H_b^2) (equation 4), genetic advance (GA) (equation 5), genetic advance as the percentage of mean (GAM) (equation 6), Pearson correlation coefficient (r) (equation 7) and path coefficient (R^2) (equation 8 and 9), according to Magar *et al*. (2021). All analyses used R software version 4.1.2 with Variability and TraitStats packages (Devaraja *et al*., 2022; Popat *et al*., 2022). The equations used are as follows:

$$CV\ (\%) = \frac{SD}{\bar{x}} \times 100 \quad ...(1)$$

$$GCV\ (\%) = \frac{\sqrt{\sigma_g^2}}{\bar{x}} \times 100 \quad ...(2)$$

$$PCV\ (\%) = \frac{\sqrt{\sigma_p^2}}{\bar{x}} \times 100 \quad ...(3)$$

Where,

SD= Standard deviation of the trait.

σ_g^2 and σ_p^2 = Genotypic and phenotypic variance.

$\bar{x}$= Mean of sample.

$$H_b^2 = \frac{\sigma_g^2}{\sigma_p^2} \times 100 \quad ...(4)$$

$$GA = K\sigma_p^2 H_b^2 \quad ...(5)$$

Where,

K= Selection differential (K = 2.056 for selecting 5% of the genotypes).

$$GAM = \frac{GA}{\bar{x}} \times 100 \quad ...(6)$$

$$r = \frac{\Sigma_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\Sigma_i (x_i - \bar{x})^2}\sqrt{\Sigma_i (y_i - \bar{y})^2}} \quad ...(7)$$

Where,

x_i and y_i= x and y variables at i.

$\bar{x}$ and $\bar{y}$= Means of x and y variables.

$$R^2 = b'_1 r_{1y} + b'_2 r_{2y} + b'_3 r_{3y} + ... \quad ...(8)$$

$$\text{Residual effect} = 1 - R^2 \quad ...(9)$$

Where,

$b'_1, b'_2, b'_3, ...$= Standardized partial regression of $x_1, x_2, x_3, ...$

$r_{1y}, r_{2y}, r_{3y}, ...$= Correlation coefficient between $x_1, x_2, x_3, ...$ and y.

RESULTS AND DISCUSSION

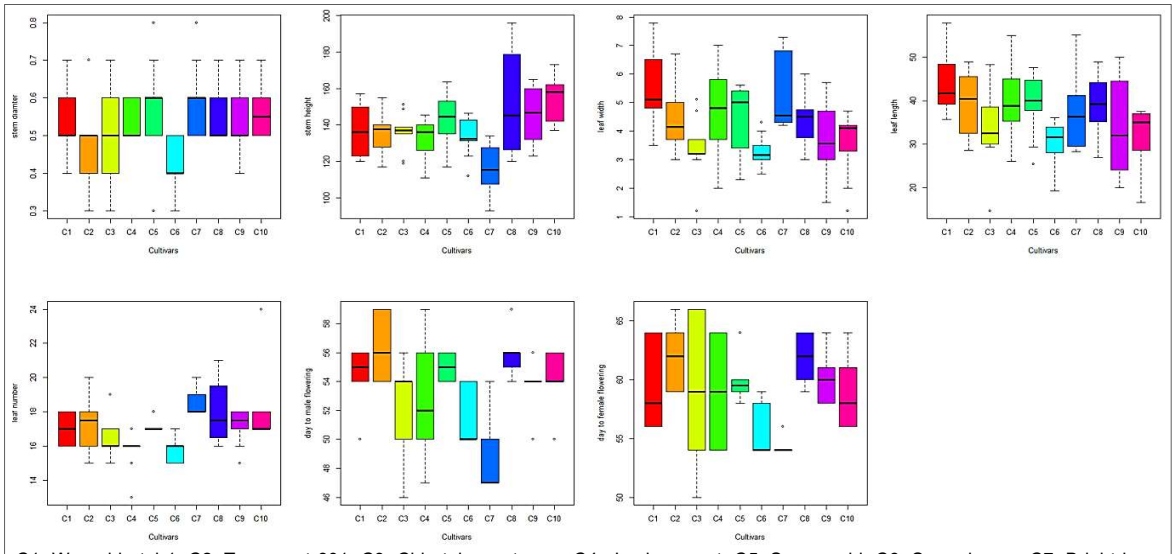
Analysis of variance (ANOVA) and genetic variability results

Table 1 presents the ANOVA of sweet corn cultivars. All agronomic traits and most yield components were significantly different among the cultivars. The CV ranged between 4.44 and 51.63%. The highest CV was observed from ear weight without husk (51.63%), followed by ear weight with husk (32.37%), leaf width (26.79%) and leaf length (21.92%). Fig 1 illustrates the boxplot on agronomic traits and Fig 2 illustrates the yield components of sweet corn cultivars. The biggest stem diameters were observed from C7 (0.60±0.03 cm) and C5 (0.57±0.04 cm). The tallest stems were observed from C10 (154.51±3.76 cm), C8 (152.00±10.50 cm) and C9 (148.80±4.84 cm). The widest and longest leaves were observed from C1 (5.54±0.43 and 44.25±0.18 cm). The highest leaf numbers were counted from C7 (18.40±0.22 leaves), C8 (18.00±0.65 leaves) and C10 (18.00±0.68 leaves). The earliest male and female flowers were observed from C7 (48.60±0.75 and 54.20±0.20 days). The longest, biggest and heaviest ears with husk were observed from C9 (27.29±0.68, 5.55±0.18 and 261.50±25.22 cm) and C10 (27.39±1.00,

Table 1: Analysis of variance of agronomic traits and yield components of sweet corn cultivars.

Traits	No. of Rep.	No. of Trt.	Trt. Mean SS	Er. Mean SS	Trait mean	Minimum	Maximum	CV (%)	Std. error
SD (cm)	3	10	0.03**	0.01	0.53	0.30	0.80	17.38	0.03
SH (cm)	3	10	1441.27**	198.72	139.24	93.00	196.00	10.12	4.46
LW (cm)	3	10	6.35**	1.33	4.30	1.20	7.80	26.79	0.36
LL (cm)	3	10	201.19**	64.98	36.78	14.60	58.00	21.92	2.55
LN (no.)	3	10	8.27**	1.60	17.16	13.00	24.00	7.37	0.40
DMF (days)	3	10	57.92**	5.65	53.49	46.00	59.00	4.44	0.75
DFF (days)	3	10	67.87**	10.65	59.15	50.00	66.00	5.52	1.03
ELWH (cm)	3	10	12.76	7.87	26.37	19.30	37.00	10.64	0.89
ELWOH (cm)	3	10	21.01**	4.57	19.08	12.10	22.70	11.20	0.68
EDWH (cm)	3	10	1.40**	0.39	5.01	3.40	7.90	12.53	0.20
EDWOH (cm)	3	10	0.10**	0.21	4.41	3.00	5.40	10.48	0.15
RPE (rows)	3	10	18.19**	2.98	12.79	8.00	18.00	13.49	0.55
KPR (kernels)	3	10	86.40*	33.09	32.68	19.00	44.00	17.60	1.82
EWWH (kg)	3	10	0.01*	0.01	0.24	0.09	0.42	32.37	0.02
EWWOH (kg)	3	10	0.01	0.01	0.19	0.07	0.70	51.63	0.03

*,**Significant difference at p<0.05 and 0.01, respectively.



C1: Wan chia tai 1, C2: Top sweet 801, C3: Chia tai sweet corn, C4: Jumbo sweet, C5: Super gold, C6: Super honey, C7: Bright jean 1357, C8: Super sweet, C9: Hi-Brix 59 and C10: Dr pek 1351.

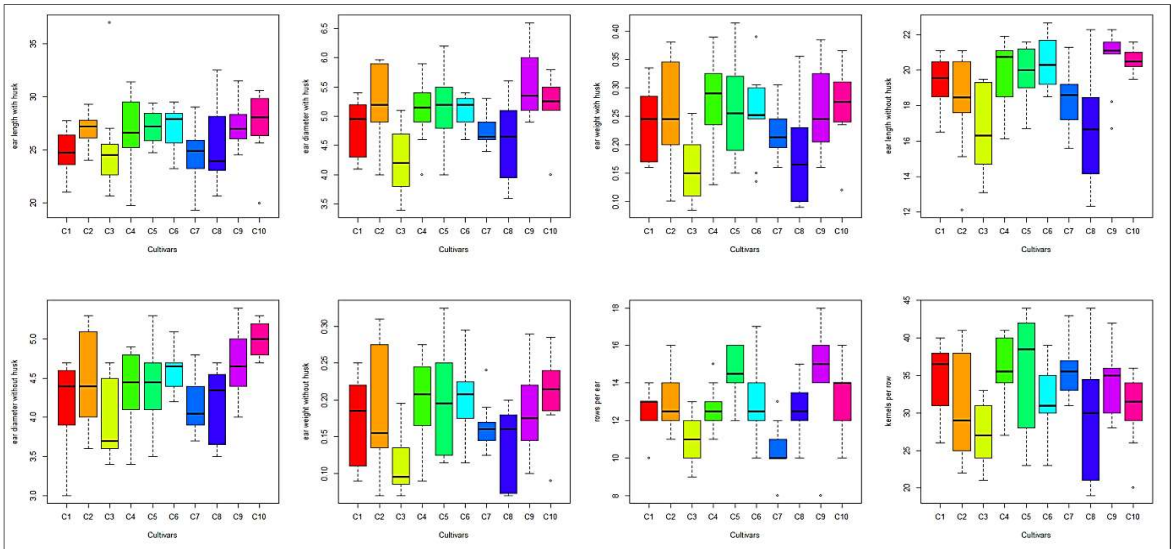
Fig 1: Boxplot on agronomic traits of sweet corn cultivars.

5.24±0.16, 271.00±21.68 cm), while the longest, biggest and heaviest ears without husk were observed from C10 (20.56±0.24, 5.00±0.08 and 211.50±17.75 cm).

Table 2 presents the GCV and PCV, H_b^2, GA and GAM of sweet corn cultivars. The PCVs were all higher than the GCVs. Leaf width (16.49), length (10.43) and ear weight with husk (12.28) show a moderate GCV while the others were low. Leaf width (31.46) and length (24.10) and ear weight without husk (45.68) show a high PCV while the others show moderate PCV, except for days to male flowering (6.17) and female flowering (6.84) and leaf number (8.77), which show a low PCV. Stem height (38.47), days to male flowering (48.07), female flowering (34.94) and rows per ear show a high H_b^2. However, only stem diameter (10.23) and rows per ear (11.55) show a high H_b^2 associated with a moderate GAM.

Correlation

Fig 3 is a scatter plot with Pearson correlation coefficients of agronomic traits and yield components of sweet corn cultivars. The highest coefficients were observed between leaf length and width (0.83***), followed by ear weight with and without husk (0.81***), ear weight with husk and diameter without husk (0.75***) and ear weight with husk



C1: Wan chia tai 1, C2: Top sweet 801, C3: Chia tai sweet corn, C4: Jumbo sweet, C5: Super gold, C6: Super honey, C7: Bright jean 1357, C8: Super sweet, C9: Hi-Brix 59 and C10: Dr pek 1351.

Fig 2: Boxplot on yield components of sweet corn cultivars.

Table 2: Genotypic and phenotypic coefficient of variations, board-sense heritability, genetic advance and genetic advance as the per cent of mean of sweet corn cultivars.

Traits	GCV	PCV	H_b^2	GA	GAM
SD	8.08:L	19.17:M	17.76:L	0.04:L	7.01:L
SH	8.01:L	12.91:M	38.47:M	14.24:M	10.23:M
LW	16.49:M	31.46:H	27.48:L	0.77:L	17.81:M
LL	10.03:M	24.10:H	17.33:L	3.16:L	8.60:L
LN	4.76:L	8.77:L	29.43:L	0.91:L	5.32:L
DMF	4.27:L	6.17:L	48.07:M	3.27:L	6.10:L
DFF	4.04:L	6.84:L	34.94:M	2.91:L	4.92:L
ELWH	2.65:L	10.96:M	5.86:L	0.35:L	1.32:L
EDWH	6.31:L	14.03:M	20.25:L	0.29:L	5.85:L
EWWH	12.28:M	34.62:H	12.57:L	0.02:L	8.97:L
ELWOH	6.72:L	13.06:M	26.47:L	1.36:L	7.12:L
EDWOH	6.34:L	12.25:M	26.80:L	0.30:L	6.76:L
EWWOH	4.71:L	45.68:H	1.06:L	0.01:L	1.00:L
RPE	9.64:L	16.58:M	33.83:M	1.48:L	11.55:M
KPR	7.07:L	18.97:M	13.88:L	1.77:L	5.42:L

L: Low, M: Medium, H: High.

and length without husk (0.73***). Ear weights with and without husk were highly correlated with ear diameter with husk (0.75 and 0.65**), ear length without husk (0.73 and 0.54**), ear diameter with husk (0.69 and 0.55**), kernels per row (0.64 and 0.63**), ear length with husk (0.60 and 0.54**), stem height (0.45 and 0.51**), rows per ear (0.42 and 0.36**) and stem diameter (0.33 and 0.32**).

Path analysis

Table 3 presents path analysis of agronomic traits and yield components on ear weight with husk. Stem height (0.154), leaf width (0.246), ear lengths with and without husk (0.138 and 0.224), ear diameters with and without husk (0.213 and 0.278) and kernels per row (0.176) had a highly positive direct effect on ear weight with husk. Table 4 presents path analysis of agronomic traits and yield components on ear weight without husk. Stem height (0.219), ear length with and without husk (0.116 and 0.125), ear diameter with husk (0.277) and kernels per row (0.288) had a high positive direct effect on ear weight without husk.

The ANOVA results indicated that all PCV values were higher than the GCV values, suggesting that the expression of all observed traits across all sweet corn cultivars was significantly influenced by environmental factors (Abe and Adelegan, 2019). The interaction between corn genotypes and the environment appeared to play a significant role in determining agronomic traits and grain yields. For example, higher temperatures could accelerate plant growth and lead to increased biomass through the flowering stage, resulting in larger and taller plants (Mansilla *et al*., 2021). According to Magar *et al*. (2021), GCVs and PCVs can be classified as low (below 10%), medium (10-20%) and high (above 20%). In plant breeding programs, traits with high GCV and PCV values are generally preferred, as they indicate a greater potential for germplasm collection and trait improvement.

The H_b^2 values are typically classified as low (below 30%), medium (30-60%), or high (above 60%), according to Chavan *et al*. (2020). Similarly, GAM can be classified as low (below 10%), medium (10-20%), or high (above 20%), as per Islam *et al*. (2015). In this study, the traits with moderate H_b^2 and moderate GAM were stem diameter and rows per ear. It suggests that the traits are likely governed by additive gene effects, while traits with low H_b^2 and GA may be regulated by non-additive gene interactions (Krishna *et al*., 2009). These findings align with results from other studies. Magar *et al*. (2021) investigated genetic variability in ten maize genotypes from Nepal. They found that PCVs were consistently higher than GCVs for yield traits. Grain yield had the highest PCV (26.91) and GCV (25.9). High H_b^2 values, coupled with high GAM, were observed in grain yield (H_b^2 = 0.93, GA = 51.36%) and 1,000-grain weight (H_b^2 = 0.99, GA = 36.95%). Vanipraveena *et al*. (2022) examined genetic variability in seven diverse sweet corn inbred lines in India. They reported high PCV and GCV values for green ear yield without husk (36.41, 25.35), green ear yield with husk (33.31, 24.63) and green fodder weight (29.20, 22.47). High H_b^2 values were observed in plant height (0.73) and ear girth (0.61). Moderate H_b^2 along with high GA was observed in green ear weight without husk (H_b^2 = 48.00%, GA = 1.12), green fodder weight (H_b^2 = 59.00%, GA = 1.57) and green ear yield with husk (H_b^2 = 54.00%, GA = 1.61).

The correlation results indicate the relationship among observed traits, but it does not provide insights into cause-and-effect relationships. Path analysis separates correlation coefficients into the direct and indirect effects of a trait. Therefore, combining correlation and path coefficient

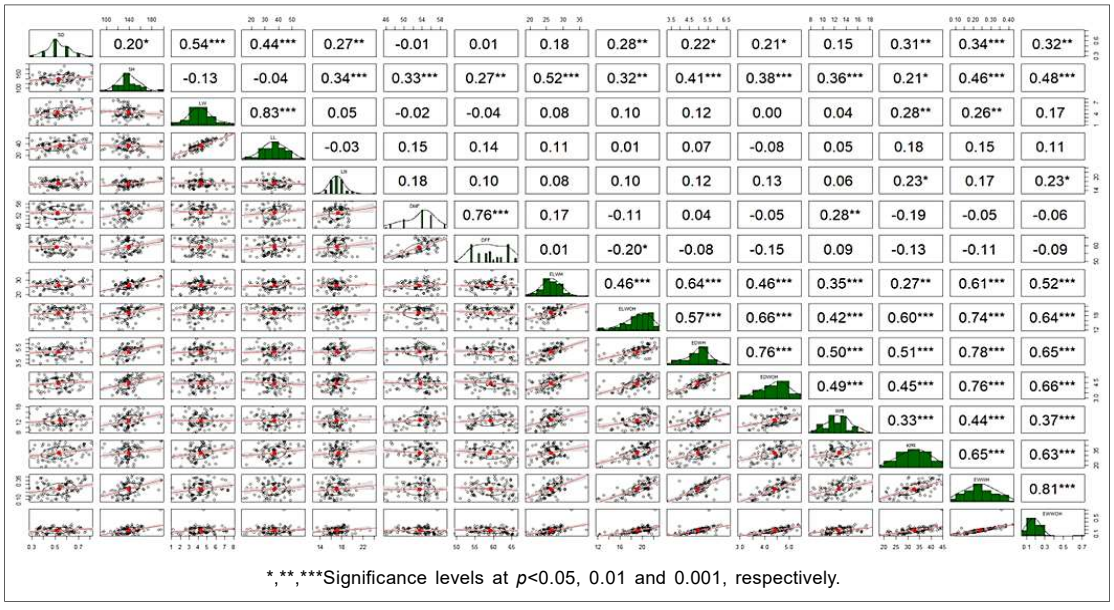


Fig 3: Scatter plot with pearson correlation coefficient among agronomic traits and yield components of sweet corn cultivars.

Table 3: Path analysis on ear weight with husk of ten sweet corn cultivars grown in Nakhon Si Thammarat, Thailand.

Traits	SD	SH	LW	LL	LN	DMF	DFF	ELWH	ELWOH	EDWH	EDWOH	RPE	KPR	r_y
SD	**-0.034**	0.031	0.143	-0.038	-0.004	0.001	0.001	0.025	0.063	0.047	0.058	-0.007	0.055	0.34
SH	-0.007	**0.154**	-0.034	0.003	-0.005	-0.023	0.015	0.072	0.072	0.087	0.106	-0.016	0.037	0.46
LW	-0.018	-0.020	**0.264**	-0.071	-0.001	0.001	-0.002	0.011	0.022	0.026	0.000	-0.002	0.049	0.26
LL	-0.015	-0.006	0.219	**-0.086**	0.000	-0.010	0.008	0.015	0.002	0.015	-0.022	-0.002	0.032	0.15
LN	-0.009	0.052	0.013	0.003	**-0.015**	-0.012	0.005	0.011	0.022	0.026	0.036	-0.003	0.041	0.17
DMF	0.000	0.051	-0.005	-0.013	-0.003	**-0.069**	0.041	0.023	-0.025	0.009	-0.014	-0.012	-0.034	-0.05
DFF	0.000	0.041	-0.011	-0.012	-0.001	-0.052	**0.054**	0.001	-0.045	-0.017	-0.042	-0.004	-0.023	-0.11
ELWH	-0.006	0.080	0.021	-0.009	-0.001	-0.012	0.001	**0.138**	0.103	0.136	0.128	-0.016	0.048	0.61
ELWOH	-0.009	0.049	0.026	-0.001	-0.001	0.008	-0.011	0.063	**0.224**	0.121	0.183	-0.019	0.106	0.74
EDWH	-0.007	0.063	0.032	-0.006	-0.002	-0.003	-0.004	0.088	0.128	**0.213**	0.211	-0.022	0.090	0.78
EDWOH	-0.007	0.058	0.000	0.007	-0.002	0.003	-0.008	0.063	0.148	0.162	**0.278**	-0.022	0.079	0.76
RPE	-0.005	0.055	0.011	-0.004	-0.001	-0.019	0.005	0.048	0.094	0.106	0.136	**-0.044**	0.058	0.44
KPR	-0.010	0.032	0.074	-0.015	-0.003	0.013	-0.007	0.037	0.135	0.109	0.125	-0.015	**0.176**	0.65

Residual effect (1-R^2) = 0.1678, bold and diagonal values indicate direct effects, the other values indicate indirect effects on ear weight with husk.

Table 4: Path analysis on ear weight without husk of ten sweet corn cultivars grown in Nakhon Si Thammarat, Thailand.

Traits	SD	SH	LW	LL	LN	DMF	DFF	ELWH	ELWOH	EDWH	EDWOH	RPE	KPR	r_y
SD	**0.011**	0.044	0.027	0.016	0.009	0.001	0.000	0.021	0.035	0.017	0.058	-0.008	0.089	0.32
SH	0.002	**0.219**	-0.007	-0.001	0.012	-0.028	0.006	0.060	0.040	0.031	0.105	-0.020	0.061	0.48
LW	0.006	-0.029	**0.051**	0.030	0.002	0.002	-0.001	0.009	0.012	0.009	0.000	-0.002	0.081	0.17
LL	0.005	-0.009	0.042	**0.036**	-0.001	-0.013	0.003	0.013	0.001	0.005	-0.022	-0.003	0.052	0.11
LN	0.003	0.075	0.003	-0.001	**0.034**	-0.015	0.002	0.009	0.012	0.009	0.036	-0.003	0.066	0.23
DMF	0.000	0.072	-0.001	0.005	0.006	**-0.084**	0.017	0.020	-0.014	0.003	-0.014	-0.016	-0.055	-0.06
DFF	0.000	0.059	-0.002	0.005	0.003	-0.064	**0.022**	0.001	-0.025	-0.006	-0.041	-0.005	-0.037	-0.09
ELWH	0.002	0.114	0.004	0.004	0.003	-0.014	0.000	**0.116**	0.057	0.048	0.127	-0.020	0.078	0.52
ELWOH	0.003	0.070	0.005	0.000	0.003	0.009	-0.004	0.053	**0.125**	0.043	0.183	-0.024	0.173	0.64
EDWH	0.002	0.090	0.006	0.003	0.004	-0.003	-0.002	0.074	0.071	**0.076**	0.210	-0.028	0.147	0.65
EDWOH	0.002	0.083	0.000	-0.003	0.004	0.004	-0.003	0.053	0.082	0.057	**0.277**	-0.028	0.130	0.66
RPE	0.002	0.079	0.002	0.002	0.002	-0.024	0.002	0.041	0.052	0.038	0.136	**-0.056**	0.095	0.37
KPR	0.003	0.046	0.014	0.006	0.008	0.016	-0.003	0.031	0.075	0.039	0.124	-0.019	**0.288**	0.63

Residual effect (1-R^2) = 0.3350, bold and diagonal values indicate direct effects, the other values indicate indirect effects on ear weight without husk.

results can help identify desirable traits for improving complex characteristics like yield (Islam *et al*., 2020). According to this study's correlation coefficients and path analysis results, traits such as stem height, ear diameter, leaf width, ear length and kernels per row are potential targets for enhancing ear weight. Mature leaves and other green tissues are primary sources of carbon and organic nitrogen in a plant's source-sink relationship. The parenchyma cells in stems and leaf sheaths often serve as temporary storage for carbon and nitrogen before fruit setting (Chang and Zhu, 2017). Additionally, maize leaves with high concentrations of nitrogen and other nutrients strengthen the source part of the source-sink relationship, providing a steady supply of photosynthates and nutrients to developing and maturing kernels (Kovacs and Vyn, 2017). These findings align with other research. Chavan *et al*. (2020) examined the correlation and path coefficients of 25 sweet corn inbred lines and found that ear weight without husk (0.911), plant height (0.086) and kernel rows per ear (0.073) had significant positive direct effects on ear yield. Crevelari *et al*. (2018) estimated the correlation coefficients among traits in hybrid corn cultivated for silage, with the highest correlation observed between grain yield and ear yield without straw (0.95**) and between ear yield with and without straw (0.92**). Genetic variability assessment is crucial for successful yield improvement in maize breeding programs. However, many traits in this population showed low or moderate genetic parameters. To better understand genetic and environmental effects, future investigations could include molecular genetics analyses in addition to field research data.

Conclusion

The evaluation of the genetic variability among ten Thai sweet corn cultivars in Nakhon Si Thammarat Province revealed significant differences in most agronomic traits and yield components. The PCVs for all observed traits were higher than the GCVs, indicating a notable environmental influence on trait expression. Stem height, days to male and female flowering and rows per ear exhibited moderate H_b^2, while stem diameter and rows per ear had moderate H_b^2 with moderate GAM. Correlation and path analysis showed that stem height, leaf width, ear length and diameter and kernels per row had a positive direct effect on ear weight with and without husk. Based on their adaptability to the local climate, the cultivars Hi-Brix 59 and Dr Pek 1351 are recommended for cultivation in Nakhon Si Thammarat.

Conflict of interest

The author declares that I have no conflict of interest regarding the publication of this paper.

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