

accumulation. Most maize detasseling studies focus on grain yield in field corn. Very few studies assess its impact on sweetness traits such as total soluble solids (TSS/°Brix), which are critical quality parameters in sweet corn. There is limited published research evaluating detasseling practices under Nepalese agro-ecological conditions, particularly in emerging sweet corn production systems.

Unlike conventional studies focused on hybrid seed production, this study investigates detasseling as a potential agronomic intervention to improve both yield and sweetness. The study evaluates different combinations of detasseling timing and extent, providing a more comprehensive understanding of their interaction effects. The research examines both agronomic performance (ear length, kernel number, yield) and quality traits (sweetness/TSS), which is rarely addressed together in previous studies. The study explores how tassel removal may influence assimilate partitioning between source and sink, contributing to a better understanding of maize physiology. This research generates locally relevant data to guide sweet corn cultivation in Nepal, where commercial demand is increasing but scientific recommendations are lacking. If detasseling can improve assimilate distribution toward ears, it could become a simple, low-cost cultural practice to enhance productivity without additional external inputs. Sweetness (°Brix) is a key determinant of consumer preference in sweet corn. Optimizing detasseling could improve market quality and competitiveness. The study addresses a clear knowledge gap regarding the physiological and agronomic effects of detasseling in sweet corn, contributing to maize research beyond its traditional use in hybrid seed production. The study aimed to evaluate the effects of varying detasseling timing and intensity and identify the optimal combination that maximizes both yield and sweetness of sweet corn.

MATERIALS AND METHODS

Experimental site

The research was carried out from April to June 2025 at A Plus Agro Farm, Sundarbazaar, Lamjung, which is located at the geographical coordinates of 28.13°N 84.42°E and at an altitude of 700 masl.

Experimental Setup

The experiment was carried out in a two-factor randomized complete block design (RCBD) with seven treatments and three replications. There were altogether 21 individual plots. Each plot measured 2.4 meters long and 2.25 meters wide (5.4 m²), with row-to-row and plant-to-plant spacing of 60 cm and 25 cm, respectively. There were 4 rows per plot, and 9 plants were allotted per row, which resulted in a total of 36 plants per plot. The inter-replication spacing was 0.5 m, and the inter-plot spacing was 0.25 m. The sweet corn variety was Karma Sweet, which is its trade name. The treatment consisted of a combination of two tassel emergence stages (50% and 100%) and three removal intensities (25%, 50%, and 75%). The details of treatments are given below:

Table 1. Details of treatments

Treatment	Description	DAS
T1	25% detasseling at 50% tassel emergence	55
T2	50% detasseling at 50% tassel emergence	55
T3	75% detasseling at 50% tassel emergence	55
T4	25% detasseling at 100% tassel emergence	58
T5	50% detasseling at 100% tassel emergence	58
T6	75% detasseling at 100% tassel emergence	58
T7	No detasseling (control)	

Field preparation and sowing

Field preparation was carried out on March 30th, 2025, through deep ploughing and levelling using hand-held tractor tillers. Layouts of the field were marked, and 5.4 m² experimental plots were made. 8 kg of FYM was broadcast per plot as a recommended dose of 15 ton/ha. The seeds were sown on 1st April 2025 by the line sowing method at a rate of 2 seeds per hill at a depth of 4 cm.

Fertilizer application and cultural practices

Chemical fertilizers were then applied following the recommended rate of 120:60:40 kg ha⁻¹ NPK. Half of the urea and the full dose of phosphorus and potassium were incorporated as a basal application. The remaining 50% of nitrogen was split into two equal parts and top-dressed at 35 days and 52 days after sowing. Thinning was done 15 days after sowing, followed by gap filling. Sweet corn requires high water demand; hence, the field was irrigated twice a week during the early stage and as needed at the later stage. Other intercultural operations like weeding, earthing up, pest control, etc. were done as per requirement.

Detasseling

Detasseling was carried out as soon as tassels began to emerge according to the assigned treatments. At 50% tassel emergence, the tassel was partially exerted from the flag leaf sheath. The central spike had broken through the flag leaf collar and become visible, while many primary branches were still enclosed. Only the upper portion of the tassel was exposed, the branches were partially separated from the central rachis, and elongation was still ongoing. In contrast, at 100% emergence, the tassel was fully exerted from the flag leaf sheath, with all branches and the central spike completely visible and fully separated from the central rachis. Detasseling was performed manually by gently grasping the tassel and pulling it upward. Then the length of each tassel was measured from the point of the lowermost tassel branch towards the tip while grasping, and the required portion was removed based on the designated percentage. The first tassel emergence (50%) was observed on the 52nd th day after sowing, and detasseling lasted till the 63rd day. Only the central plants, excluding border plants, were detasseled.

Pollination

Hand pollination was performed even though sweet corn is an early-maturing crop. The experiment coincided with the peak reproductive stage of surrounding maize fields in Lamjung, increasing the risk of foreign pollen contamination, which can significantly reduce sweetness. To prevent this, silks were bagged immediately after emergence. Hand pollination was carried out twice, on the 62nd and 64th days. The cob bags were removed two days after each pollination event.

Harvesting and Data Collection

The cobs were harvested after the 81st day, and the yield attributes, like fresh ear weight, net plot yield, number of kernel rows, number of kernels per ear row, cob length, cob diameter, number of grains per ear, and number of cobs per plant, were taken at the time of harvest. The data were taken from 10 randomly selected plants for all yield attributes. Sweetness was measured as soon as the cobs were harvested because sweet corn loses its sweetness very quickly after harvest. For sweetness analysis, juice was extracted from the kernels of ten randomly selected cobs per treatment, mixed thoroughly, and readings were taken using a digital Brix refractometer.

Statistical Analysis

The collected data were entered into Microsoft Excel and analyzed using R software (version 4.2.3). A two-way analysis of variance (ANOVA) was performed to evaluate the effects of detasseling timing and intensity and their interaction, excluding the absolute control treatment. Additionally, a one-way ANOVA was conducted including all treatments (with control) to compare detasseled and non-detasseled plants. Mean separation was carried out using Duncan's Multiple Range Test (DMRT) at the 5% level of significance ($p \leq 0.05$)

RESULTS AND DISCUSSION

There were two phases of data analysis. The treatment involved absolute control; therefore, a two-factor analysis was conducted, excluding the control group, to compare the different detasseling combinations. This analysis is presented in Table 2.

Table 2. Yield parameters in response to interaction of detasseling timing and intensity

Treatment	Fresh ear weight (g)	Net plot yield (kg/2.1 m ²)	No. of kernels/row	No. of rows/cob	No. of cobs/plant	Ear length (cm)	Ear diameter (dehusked) (cm)
Timing							
50%	340b	3.04b	37.33b	16.45b	1.33a	16.72b	4.90b
100%	360a	3.42a	38.58a	16.92a	1.42a	17.62a	5.29a
LSD(0.05)	11.32	0.22	0.83	0.27	0.09	0.78	0.36
SEm(±)	3.595	0.07	0.265	0.152	0.031	0.248	0.117
F prob	**	**	**	**	NS	*	*
Intensity							
25%	318c	2.75c	36.58c	16.10c	1.30b	15.60b	4.69b
50%	350b	3.20b	38.01b	16.49b	1.36ab	17.92a	5.22a
75%	383a	3.75a	39.28a	16.91a	1.46a	18.17a	5.37a
LSD(0.05)	13.87	0.27	1.02	0.32	0.12	0.95	0.45
SEm(±)	4.02	0.086	0.325	0.186	0.038	0.304	0.143
F test	***	***	***	***	*	***	*
CV%	14.08	12.49	6.09	9.67	9.84	7.32	6.88
Grand Mean	343	3.13	37.68	16.84	1.35	16.88	4.99

The common letter(s) within the column indicate non-significant difference based on the Duncan multiple range tests (DMRT) at a 0.05 level of significance, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance.

Then, single-factor analysis was done for all the treatments, including control, to compare the effects of tasseled and detasseled plants. All the combinations except 50:25 performed significantly well as compared to the control in all parameters (Table 2).

Table 3. Mean values of measured parameters under different treatment

Treatment	Length (cm)	Cobs	Weight (g)	Sweetness (°Brix)	kernel	Row	Grains	Diameter(cm)	Yield kg/2.1m ²
T1	15.25 ^b	1.26	310 ^{de}	12.40 ^d	36.39 ^b	16.50 ^{bc}	600 ^c	4.44 ^{bc}	2.62 ^d
T2	17.55 ^a	1.33	340 ^c	13.60 ^c	36.80 ^b	16.71 ^{bc}	614 ^c	5.02 ^a	3.03 ^{bcd}
T3	17.75 ^a	1.4	370 ^b	14.50 ^{bc}	38.79 ^a	18.01 ^{ab}	698 ^b	5.25 ^a	3.46 ^b
T4	15.96 ^b	1.33	325 ^{cd}	12.45 ^d	36.76 ^b	16.59 ^{bc}	609 ^c	4.94 ^{abc}	2.87 ^{cd}
T5	18.30 ^a	1.4	360 ^b	15.40 ^{ab}	39.22 ^a	18.44 ^a	724 ^{ab}	5.42 ^a	3.36 ^{bc}
T6	18.60 ^a	1.53	395 ^a	15.80 ^a	39.76 ^a	18.52 ^a	746 ^a	5.50 ^a	4.04 ^a
T7	14.80 ^b	1.28	302 ^e	12.09 ^d	36.07 ^b	16 ^c	578 ^c	4.38 ^c	2.53 ^d
LSD (0.05)	1.23	0.2	19.81	0.94	1.39	1.03	46.12	0.59	0.49
SEm(±)	0.1513	0.024	2.429	0.116	0.1716	0.147	5.657	0.0733	0.0612
F test	***	NS	***	***	***	**	***	**	***
CV%	4.1	8.27	4.25	6.86	6.08	7.99	5.27	6.74	8.96
Grand Mean	16.88	1.36	343.14	13.75	37.69	16.84	652.71	4.99	3.13

The common letter(s) within the column indicate non-significant difference based on the Duncan multiple range tests (DMRT) at a 0.05 level of significance, * significant at 5% level of significance, ** significant at 1% level of significance, *** significant at 0.1% level of significance.

Fresh ear weight and net plot yield

Detasseling at 100% emergence and 75% intensity showed a significant increase in fresh ear weight by 6% ($p \leq 0.01$) and 20% ($p \leq 0.001$). There was an increment in net plot yield (kg/2.1 m²) by 12% ($p \leq 0.01$) and 36% ($p \leq 0.001$) due to detasseling at 100% emergence and 75% intensity as compared to 50% emergence and 25% intensity. Similar findings were observed by Nithinkumar et al (2024). Detasseling at anthesis removes the resources of IAA, which controls the apical dominance, allowing more assimilates to be allocated to the ear (Murindangabo et al 2019). Detasseling at 50% emergence doesn't allow enough resource allocation towards the cob, as the tassel is still in the elongation phase and hasn't completed its maturity, due to which the nutrients are still utilized by the tassel for its growth.

Number of cobs per plant

Timing of tassel removal had no effect on the number of cobs. In fact, the detasseling combinations were statistically similar to the control. However, detasseling 75% of the tassel increased the number of cobs per plant by 12% with respect to 25% detasseling ($p \leq 0.05$). The results are strongly supported by findings of Moreira et al 2010, where detasseling in baby corn increases the number and total weight of ears and marketable unhusked ears. The number of ears per plant is largely regulated by internal plant hormones that are mainly influenced by apical dominance (Lahay et al 2019). Detasseling redirects the nutrients towards the cob, as the tassel is the main source of IAA, hence reducing competition and stimulating the number of ears.

Number of kernels/row and kernel rows/cob

Detasseling at 100% tassel emergence significantly increased both the number of kernels per row and the number of kernel rows per cob by 3% ($p \leq 0.01$) compared to detasseling at 50% emergence. Similarly, detasseling 75% of the tassel also caused a significant rise in kernels per row (7%) and rows per cob (5%) at $p \leq 0.001$ when compared to 25% detasseling. These findings agree with the results of Sammauria et al (2019). Liang et al (2025) found that detasseling improves source-sink carbon partitioning by eliminating apical dominance, increasing light penetration, and enhancing assimilate allocation to the ear in maize, which ultimately improves yield potential. The increase in detasseling intensity promoted more assimilates being translocated into the ear, increasing the weight, kernels per ear row, and rows per cob.

Ear length and ear diameter

Detasseling at 100% tassel emergence increased cob length by 5% ($p \leq 0.05$), while 75% detasseling intensity resulted in a larger increase of 16% ($p \leq 0.001$). The dehusked ear diameter also improved by 8% and 14% at these respective levels ($p \leq 0.05$). The findings match with Murindangabo et al 2019 where he found detasseling removed the apical dominance, allocating more nutrients to the ear, as shown by the larger ear result and increased yield from the detasseled treatment compared to the intact control.

Grains per cob and sweetness

These were the only parameters that showed a significant interaction between detasseling timing and detasseling intensity. The combination 100:75 produced the best results, increasing grains per cob by 25% and sweetness by 27% ($p \leq 0.05$) compared to the 50:25. The visual result is shown in the error bar below

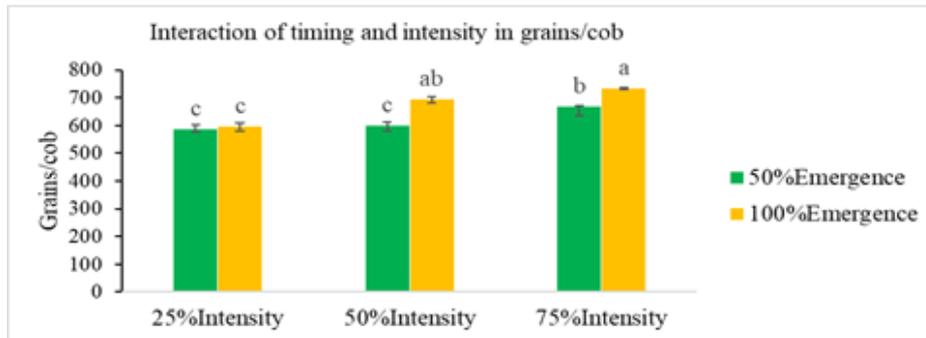


Fig. 1. Effect of interaction of tassel emergence and detasseling intensity in grains/cob

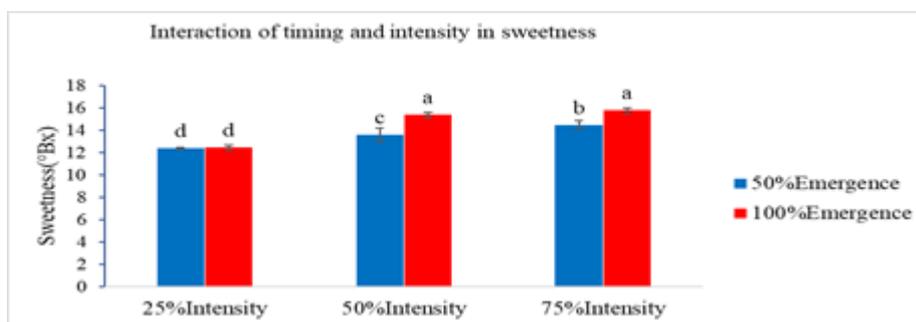


Fig. 2. Effect of interaction of tassel emergence and detasseling intensity in sweetness

The observations were like Sammauria et al (2019). Detasseling removes the apical sink (tassel), potentially redirecting photo assimilates toward the ear that can lead to increased sweetness, as more carbohydrates are available for ear development (Gao et al 2020). Detasseling increases photosynthetically active radiation reaching the leaves and reduction of auxins during the reproductive stages (Murindangabo et al 2019). A recent research conducted by Saleem et al 2025 shows that optimized canopies intercept more PAR than typical commercial canopies, suggesting potential gains in light capture, biomass accumulation and yield components (including kernel number). Higher intensity of detasseling in full maturity of tassel allows more assimilates to be diverted towards the cobs resulting in increased sweetness and grains/cob as compared with lower intensity treatments as tassel has completed its growth and reduces the competition between the tassel and cob for resources.

CONCLUSION

The study demonstrated that both detasseling timing and intensity significantly influenced the yield and sweetness of sweet corn. Among all treatments, detasseling at 100% tassel emergence combined with 75% tassel removal (T6) produced the superior performance, resulting the highest yield and sweetness. The significant interaction effect observed for sweetness indicates that the effectiveness of detasseling for increasing sweetness depends on the appropriate combination of timing and intensity. Detasseling at full tassel emergence potentially enhanced assimilate translocation toward the ear by reducing apical dominance and competition for nutrients, thereby improving both productivity and quality. Therefore, partial detasseling (75%) at complete tassel emergence can be recommended as a practical agronomic strategy to enhance sweet corn yield and sweetness under Lamjung conditions. However, it must be further studied in terms of economic perspective as it is labor intensive and costly and multi-seasonal trials must be conducted before large scale recommendation.

ACKNOWLEDGEMENTS

The authors are deeply grateful to their advisor for their constant guidance and support throughout this work. The authors also thank their friends for their encouragement and help whenever needed. Finally, the authors would like to thank Lamjung campus and A Plus Agro Farm for providing the environment and resources that made this research possible.

AUTHORS' CONTRIBUTION

Bedanta Ghimire is the principal researcher who conceived, designed, and performed the experiment. Sudikshya Shrestha and Bishnu Prasad Kandel gave their valuable advisory. Aashray Bhandari and Madan Rijal helped in the detasseling procedure and data collection.

CONFLICT OF INTEREST

The author declares no conflict of interest related to this study.

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