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Evaluation of the agronomic performances of the Kanz wheat variety (*Triticum sp*.) based on two sowing dates in Burkina Faso

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1 ABSTRACT

Wheat (*Triticum* sp.) is one of the major cereals grown worldwide and is an important source of human food. Wheat in Burkina Faso was formerly perceived as a cereal impossible to cultivate on a large scale in the Sahel. has become the symbol of the fight for food self-sufficiency. One of the limits to the promotion of the wheat in Burkina Faso is the lack of knowledge of the optimal sowing dates by producers according to the growing zones. The establishment of an agronomic trial program is an important step in identifying and popularizing these calendars in order to achieve this objective. In this context, an elite wheat variety (Kanz) was subjected to two sowing date modalities under field conditions. The study aims to determine the optimal sowing date to achieve maximum productivity and to understand how sowing dates affect agronomic traits. The characterization was made based on nine (9) quantitative characters following a Fisher block design with three repetitions. The combined analysis of the phenotypic variability observed in each trial revealed very significant differences between the two sowing dates in terms of the performance of the variety. It showed better performance in the test setup on date D1. There is a reduction in vegetative growth, the cycle, and production potential when transplanting is done late. The linear regression method made it possible to establish relationships between temperature and agromorphological characteristics (production potential and cycle). This study highlights the determining impact of the cropping calendar on wheat yield and provides scientific bases to optimize future research protocols.

2 INTRODUCTION

Wheat (*Triticum spp.*), belonging to the Poaceae (Gramineae) family, has been a pillar of human civilization for more than 10,000 years (Penn, 2021). Its versatility, its ability to adapt to various climates, its ease of storage, and its high caloric and nutritional value make it a key element in meeting global food needs. Accounting for 20% of daily calorie and protein intake, wheat is an essential part of the human diet and ranks as the second most important food crop in developing countries, after rice (Iqbal *et al.,* 2022). Cultivated on 222 million hectares across the world, wheat remains an essential cereal, with production of around 783 million tonnes in 2022 (FAO, 2023). Between 2019 and 2023, Burkina Faso imported on average 193,000 tonnes of wheat per year, representing an annual dependence of around 42.5 billion FCFA. This observation, highlighted by MARAH (2025), weakens national food sovereignty. In response, local production has become a strategic priority, for economic, food, and social reasons, hence the inclusion of wheat among the strategic sectors of the Agropastoral and Fisheries Offensive (OAPH) 2023-2025. Thus, the State has supported producers with inputs and agricultural equipment with the aim of promoting production at the national level. However, after two implementation campaigns, the relaunch of wheat production in Burkina remains limited by several factors, including the poor control of technical routes. Therefore, having a production guide is imperative in order to promote sustainable and profitable production, capable of meeting the needs of the population, both nutritionally and economically. It is in this perspective that the present study was carried out by choosing the Kanz variety, currently popularized and cultivated in Burkina Faso. The general objective of this work is to evaluate the influence of the sowing date on the agronomic performances of the variety in order to optimize its technical route in Burkina Faso. Specifically, these are :

-Determine the impact of two sowing dates on the phenological cycle of the crop

-Compare the components of performance.

-And to identify the sowing period which minimizes the risk of thermal scalding when filling the grains.

2 MATERIALS AND METHODS

2.1 Plant materials: The study focused on the variety of soft wheat (*Triticum aestivum* L.): Kanz, selected for its agronomic importance. It is one of the varieties of wheat popularized and cultivated in Burkina Faso

2.2 Study area experimental device: The study was carried out on the site of the agricultural company LAVODEC in Neboun (11°18'44" North and 1°52'32" West) in the commune of Biha, province of Sissili in the Nando region. The experiment consisted of two plots established on two different dates: October 10 (D1) and November 9 (D2). The first date (D1) corresponds to the early sowing date, and the second date (D2) corresponds to the main sowing date of the variety in Burkina Faso. The experimental design was a completely randomized block with three repetitions for each experimental trial. In total, ten (10) lines of 100 m length were prepared for each repetition. The distance between two consecutive lines was 15 cm. The distance between two pockets on the same line was 12.5 cm, and the distance between two repetitions was 1 m. The total area of each experiment was 605 m² (6.05 m × 100 m). During the experiment, the sums of the temperatures were 1713 °C and 2719.5 °C, respectively, at the heading and maturity stages, concerning the first sowing date (D1). On the second sowing date (D2), we note 1617°C and 2507.5°C for the same phenological stages.

2.3 Quantitative traits: Nine quantitative traits linked to vegetative development, cycle, and yield components were evaluated (Table 1). This is the number of days between sowing and heading of the back plant of the line on the one hand and on the other hand the number of days between sowing and maturity of the back plant of the line, the Number of ears per plant, the Length of the ear, the Length of the beard; the Number of grains per ear, the dry weight of the ear, and the weight of a thousand grains. Weight was estimated using an electronic scale with a maximum capacity of 1 kg.

Table 1: The quantitative variables evaluated

Variables	Abréviations
Number of Days to Heading (days)	**NDH**
Number of Days to Maturity (days)	**NDM**
Length of the Beard (mm)	**BLe**
Number of Ears per Plant	**NEP**
Ear Length (cm)	**ELe**
Ear Dry Weight (g)	**EDW**
Number of Grains per Ear	**NGE**
Thousand Grain Weights (g)	**TGW**
Plant Height at Maturity (cm)	**PHM**

2.4 Data analysis : After checking the normality of the data, a Student's test was performed to compare the means between the two dates (D1 and D2). The comparison of the nine variables was illustrated using box plots. The study of relationships between characters was carried out using the Pearson correlation matrix. Finally, a linear regression was modelled between temperature and the main agro-morphological traits (NJM and PGM). All analyses were performed with RStudio software (version 2026.01.1).

3 RESULTS

3.1 Agronomic performance of the variety according to sowing dates: The traits evaluated varied significantly depending on the transplanting dates (Table 2). Except for the number of days to heading (NDH), all other traits showed highly significant differences ($P<0.001$). The variety showed better vegetative development (HPM) on the D1 date. Likewise, it presented a better performance of the yield components (NEP; NGE; EDW; TGW) on the same date (D1). The comparative analysis (Boxplots) shows a significant difference in all the yield components and morphological parameters between the first (D1) and the second sowing date (D2). For almost all variables (HPM, BLe, ELe, NEP, NGE, NDM, EDW, TGW), the values of the second sowing date are significantly lower than those of the first (D1) (Figure 1).

Table 2: Variation of the characters evaluated according to the transplanting dates

Dates	HPM (cm)	NDH (days)	NDM (days)	BLe (mm)	NEP	ELe (cm)	NGE	EDW (g)	TGW (g)
D1	59.65 a	56.533 a	91.93 a	5.52 a	30.63 a	13.72 a	47.73 a	2.31 a	47.0 a
D2	51.03 b	55.833 a	89.03 b	4.38 b	19.73 b	12.10 b	38.33 b	1.91 b	38.7 b
Pr > F	0.000	0.321	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Legend: PHM: Height of the plant at maturity (cm), **NDH**: Number of days to heading (days); **NDM**: Number of days to maturity (days); **BLe**: Length of the beard (mm); **NEP**: Number of ears per plant; **ELe**: Ear length (cm); **NGE**: Number of grains per ear; **EDW**(g): Dry weight of the cob; **TGW**(g): thousand grain weights

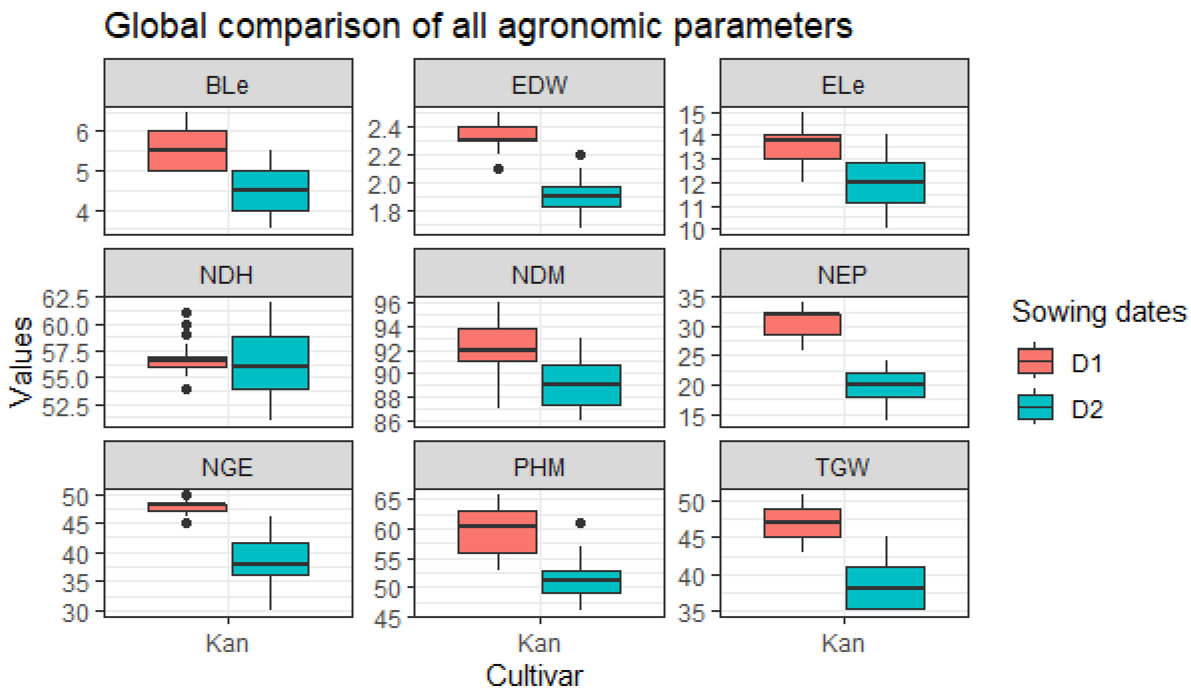

Figure 1 : Comparative graphs (Boxplots) of the nine characters evaluated according to sowing dates
Legend: PHM: Height of the plant at maturity (cm), **NDH**: Number of days to heading (days); **NDM**: Number of days to maturity (days); **BLe**: Length of the beard (mm); **NEP**: Number of ears per plant; **ELe**: Ear length (cm); **NGE**: Number of grains per ear; **EDW**(g): Dry weight of the cob; **TGW**(g): thousand grain weights

3.2 Correlations between the quantitative characteristics studied according to the different sowing dates: The study of relationships between quantitative characteristics made it possible to highlight significant correlations between them. The analysis of Pearson correlations (Figure 2) for D1 shows an overall independence between the quantitative characteristics studied. The most significant negative relationship is observed between PHM and NEP (r = -0.43). Conversely, a modest positive correlation appears between TGW and BLe (r = 0.27). The correlation matrix (Figure 3) reveals moderate positive relationships, which exist, respectively, between BLe and NGE (r=0.31); NDM and NEP (r=0.30), and between PHM and PGE (r=0.29). However, there is a moderate negative relationship between plant height (HPM) and the number of ears (NEP)

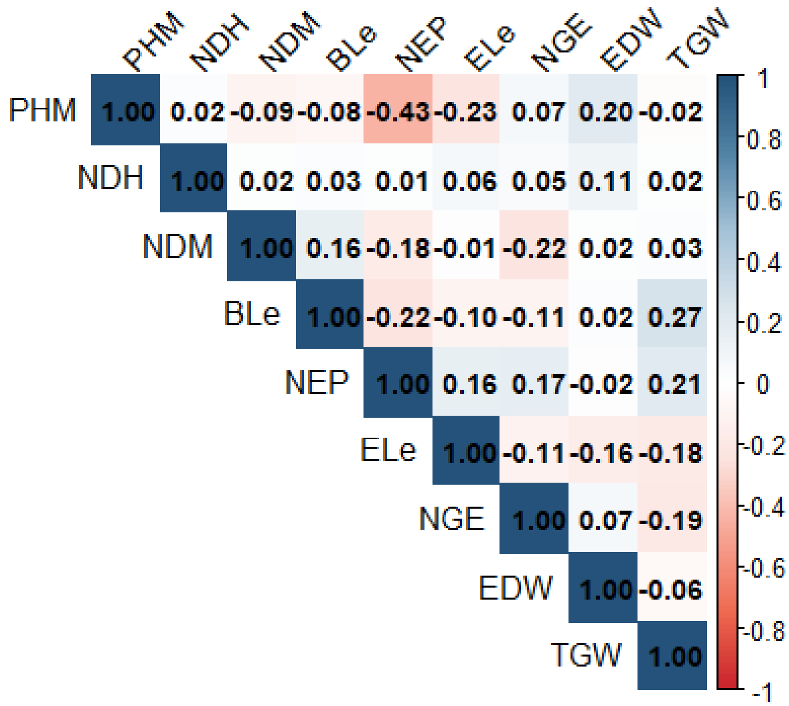

Figure 2: Correlations between quantitative characteristics evaluated at D1
Legend: PHM: Height of the plant at maturity (cm), **NDH**: Number of days to heading (days); **NDM**: Number of days to maturity (days); **BLe**: Length of the beard (mm); **NEP**: Number of ears per plant; **ELe**: Ear length (cm); **NGE**: Number of grains per ear; **EDW**(g): Dry weight of the cob; **TGW**(g): thousand grain weights.

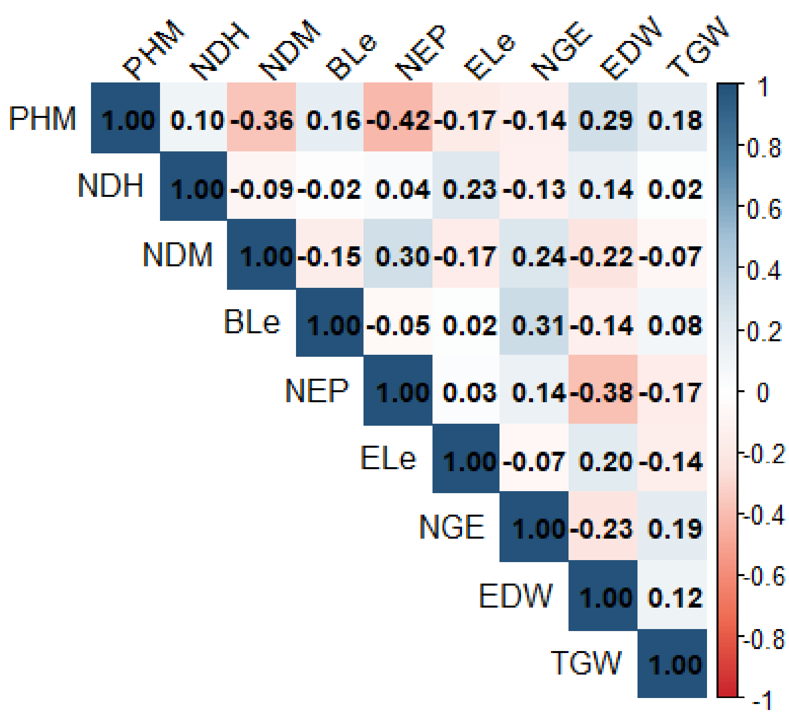

Figure 3: Correlations between quantitative characteristics evaluated at D2
Legend: PHM: Height of the plant at maturity (cm), **NDH**: Number of days to heading (days); **NDM**: Number of days to maturity (days); **BLe**: Length of the beard (mm); **NEP**: Number of ears per plant; **ELe**: Ear length (cm); **NGE**: Number of grains per ear; **EDW**(g): Dry weight of the cob; **TGW**(g): thousand grain weights

3.3 Modelling of cycle length (NDM) and yield (TGW) as a function of temperature for the first sowing date (D1): The linear regressions were significant in the first experiment (D1). The values of the coefficient of determination R^2 associated with the model estimates were 0.66 and 0.93 for yield (TGW) and cycle (NDM), respectively (Table 3). Thus, the analysis of variance shows that temperature had a significant effect (P<0,001) on performance $(\mathrm{TGW} = -2.18273 + 0.01820\, x\, T°C)$ et le cycle $(\mathrm{NDM}) = 4.0429 + 0.0324\, x\, T°C)$.

Table 3: Model parameters at date D1

	Source of variation	DDL	SC	MC	F	Pr > F
Cycle (NDM)	**T(°C)**	1	133.169	133.169	428.68	<2e-16 ***
	Residue	28	8,698	0,311		
Rdt (TGW)	**T(°C)**	1	85.772	85.772	54.3	5.037e-08
	Residue	28	44.228	1.580		

Legend: T°C: sum of temperatures during the cycle; **SC**: Sum of squares; **MC**: Mean squares; **NDM**: Number of Days to Maturity, Yield: yield component; **TGW**: Weight of a thousand Grains

3.4 Modelling of cycle length (NDM) and yield (TGW) as a function of temperature for the second sowing date (D1): The linear regressions were significant between the cycle (NDM) on the one hand, the yield (TGW) on the other hand, and the temperature during the second experiment. The statistical analysis shows that temperature had a significant effect (P<0.001) on grain production (TGW = -49.931 + 0.035 x T° C) and cycle (NDM = 19.050 + 0.028 x T° C) (Table 4).

Table 4: Model parameters at date D2

	Source of variation	DDL	SC	MC	F	Pr > F
Cycle (NDM)	**T(°C)**	1	117.131	117.131	1787.1	< 2.2e-16 ***
	Residue	28	1.835	0.066		
Rdt (TGW)	**T(°C)**	1	181.09	181.086		1.986e-06 ***
	Residue	28	142.28	5.081		

Legend: T°C: sum of temperatures during the cycle; **SC**: Sum of squares; **MC**: Mean squares; **NDM**: Number of Days to Maturity, Yield: yield component; **TGW**: Weight of a thousand

4 DISCUSSION

The combined analysis of the phenotypic variability observed in each trial revealed very significant differences between the two sowing dates, with regard to the performance of the variety, in particular the dimensions of the foliage, the cycle and the grain production potential. Only the number of days at heading (NDH) was not discriminating. The variety showed better performance in the trial set up on date D1. It was noted that a reduction in vegetative growth, the cycle, as well as the grain production potential when transplanting is done late. Previous research has mentioned the crucial role of sowing time in achieving optimal growth and productivity of wheat (Chhokar *et al.* 2023; LIU *et al.* 2021). According to Ikram *et al.* (2025), sowing date has a significant impact on plant height, number of tillers per square meter, ear length, number of grains per ear, 1000 grain weight, and grain yield of wheat. Such observations have been mentioned in other cultivated species. Indeed, Taipodia and Shukla (2013) showed that the size of stems and the number of leaves in maize vary depending on the sowing date. Thongam *et al.* (2017) argued that strong vegetative development is attributable to the prevalence of favourable temperatures. This suggests that the D1 date would correspond to the optimal climatic period. Tonde *et al.* (2024) also showed that the transplanting period significantly influences the cycle and yield in *Solenostemon rotundifolius*. Finally, Vaksmann *et al.* (1996) demonstrated that, depending on the sowing date, the cycle length of sorghum varies from 90 to 190 days due to high sensitivity to photoperiod. These observations highlight the critical importance of choosing the sowing date, wheat also being a photoperiodic plant, the majority of the characteristics evaluated are independent of each other. There is no correlation greater than 0.7 or less than -0.7. The relationships that do exist are moderate at best, suggesting that these traits do not directly influence each other in predictable ways. However, the relationship between plant height (PHM) and number of ears (NEF) is negative and moderate, with a coefficient of r = -0.43. This means that, in our study, the taller the plants, the more they tended to have a reduced number of spikes and vice versa. A positive correlation between BLe and NGE on the one hand and between PMG and LdB on the other hand suggests that ears with longer awns tend to have a higher Number of Seeds per Ear (NGE) and thousand-grain weight. Under certain conditions (particularly in dry areas), long awns contribute to the photosynthesis of the ear. They help to better nourish the forming grains, which can promote a greater number of viable seeds per ear (BLUM, 1985). These correlations are particularly interesting for producers because wheat is grown mainly for its grains. A positive correlation between NDM and NEP suggests that the number of days to maturity is related to the number of ears. Thus, a longer cycle would potentially allow the plant to establish more reproductive organs.

The atmosphere, being an essential component of the natural environment of living beings in general and of plants in particular, the complex chain of meteorological processes that take place there delivers to plants quantities of light, heat, gas exchanges, and water. Plant metabolism depends on weather conditions. Daily monitoring of weather parameters is an important factor in decision-making, management, and plant development. Bambara *et al.* (2019) showed the influence of climatic parameters on the growth, development, and production of crops. The present study revealed relationships between temperature and agromorphological traits (NGE and NDM). Climatic parameters are essential for decision-making. Their monitoring will make it possible to plan favourable periods for any activity in the production process (choice of crop, date, and medium of sowing, watering, and harvest) in order to optimize the performance of the crop with a view to better yield (Previmeteo, 2018). For example, temperature accumulations represent a major factor for crop metabolism (Maamri, 2018). Such a factor would have contributed to the phenotypic variability observed in our study. The linear regression method allowed us to establish relationships between the explained variables (production potential and the cycle) and the explanatory variable (temperature). The significant results obtained for the cycle and production regressions show that temperature significantly influences the development and growth of wheat. The impact of the dynamics of climatic parameters on plant production has been demonstrated by several authors. This is the case of FAURIE *et al.* (2011) who maintain that the combined action of climatic factors directly conditions the distribution and development of plant species. According to Mergeai *et al.* (1991), the isolation received by cotton plants at the start of their vegetative development directly influences the level of final production of the plants. Likewise, low night temperatures have a positive influence on cotton productivity. These results highlight the ability of the KANZ variety to adapt to early sowing, which suggests increased yield potential if sown during the first half of October. These results are valuable in helping farmers, agronomists, and policy makers refine wheat sowing schedules to adapt to changing climatic conditions. Given the increasing unpredictability of seasonal patterns, adjusting sowing dates can be an effective agronomic strategy to mitigate yield losses due to environmental stresses.

5 CONCLUSION

This study highlighted the influence of sowing date on the agromorphological performance of wheat (KANZ variety) in Burkina Faso. The results obtained revealed the crucial importance of the crop calendar for this cereal in our growing areas. The use of linear regression has also confirmed that temperature is a determining factor, directly influencing the growth and filling of grains. Thus, the success of wheat cultivation in Burkina Faso will rely on rigorous planning based on the monitoring of meteorological parameters. This study opens the way to a better definition of national growing calendars and suggests that the selection of varieties with long beards could constitute an interesting avenue for improving productivity in our growing areas.

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7 REFERENCES

Bambara D., Sawadogo J., Kaboré O., Bilgo A.,2019. Variabilité de certains paramètres climatiques et impacts sur la durée des périodes humides de développement végétal dans une station au centre et une autre au nord du Burkina Faso. *VertigO*, *19*(1). https://id.erudit.org/iderudit/1065431ar.

Blum A., 1985. Photosynthesis and transpiration in leaves and ears of wheat and barley varieties. *Journal of Experimental Botany* .

Chhokar, R. S., Sharma, R. K., Kumar, N., Singh, R. K., & Singh, G. P.,2023. Advancing sowing time and conservation tillage-the climate-resilient approach to enhance the productivity and profitability of wheat. International Journal of Plant Production, 17(1), 121-131.

FAO,2023. World Food and Agriculture – Statistical yearbook 2023. Food and Agriculture Organization of the United Nations. https://www.fao.org/statistics/yearbook.

Faurie C., Ferra C., Médori P., Dévaux J. Et Hempton J.-L., 2011. *Écologie : Approche scientifique et pratique*. 6ème édition. Paris : Lavoisier (Tec & Doc).

Ikram M., Masood M.U., Monga V., Ikram A., Ahmad T., Alishba, Ahad M. Et Zahid S., 2025. Evaluating the Impact of Different Sowing Dates on Growth and Yield of Wheat Crop. *Planta Animalia*, 4(1) : 175-184 .

Iqbal MJ, Shams N, Fatima K.,2022. Nutritional quality of wheat. In : Wheat-Recent Advances. London, UK: IntechOpen

Liu, K., Zhang, C., Guan, B., Yang, R., Liu, K., Wang, Z., ... & Wang, X.,2021. The effect of different sowing dates on dry matter and nitrogen dynamics for winter wheat: an experimental simulation study. PeerJ, 9, e11700

Maamri K.,2018. Stabilité du critère de la discrimination du carbone isotopique en relation avec le poids spécifique de la feuille drapeau chez quelques variétés de blé dur cultivées en milieu semi-aride (Doctoral dissertation) .

Marah,2025. Ministère de l'Agriculture, des Ressources Animales et Halieutiques. *Guide de production du blé au Burkina Faso*. Direction Générale des Productions Végétales (DGPV).

Mergeai G., & Demol J., 1991. Contribution à l'étude de l'influence de divers facteurs météorologiques sur la production et la qualité des fibres chez le cotonnier Gossypium hirsutum L. *Bulletin des Recherches Agronomiques de Gembloux*, *26*(1) .

Penn R. S. R.,2021. A Bread-Making Adventure. London, United Kingdom: Penguin UK ;

Previmeteo,2018. L'impact de la météo sur l'agriculture *: Dossier spécial*. ttps://blog.previmeteo.com/impact-meteo-agriculture/.

Taipodia R. And Shukla A. K., 2013. Effect of Planting Time on Growth and Yield of Winter Maize (*Zea mays* L.) after Harvesting Rice. J Krishi Vigyan. Vol 2 (1): 15-18p.

Thongam B., Kadam A., Singh A. A. And Singh Y. H., 2017. Influence of planting dates on growth and yield of potato (Solanum tuberosum L.). Journal of Pharmacognosy and Phytochemistry. Vol 6 (6): 1243-1246p.

Tonde I., Kiebre Z. Et Nanema R. K., 2024. Effect of planting dates on the quantitative traits of *Solenostemon rotundifolius* [(Poir.) J. K. Morton]. *Journal of Applied Biosciences*, 193: 20436 – 20448.

Vaksmann M., Traore S.B., Niangado O.,1996. Le photopériodisme des sorghos africains. Agriculture et développement N° 9. 15-18 p.