

KUFRI BHASKAR: A CLIMATE-RESILIENT POTATO VARIETY WITH STABLE YIELD UNDER HEAT STRESS CONDITIONS

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ABSTRACT: Kufri Bhaskar is a heat tolerant table potato variety suitable for early planting in Northern plains and for main season planting in Central plains. It is a cross of Kufri Khyati and Kufri Surya. Its plants are tall and vigorous with tolerance to mite and hopperburn. It produces attractive white-cream, ovoid tubers with shallow eyes and cream flesh, possesses 20% tuber dry matter and very good keeping quality. Kufri Bhaskar was trialed across the major growing regions of India along with popular heat tolerant check varieties Kufri Surya and Kufri Kiran. Kufri Bhaskar has ability to produce up to 11% higher tuber yield than heat tolerant variety Kufri Kiran and 17% over popular variety Kufri Surya across potato growing regions of country.

Key words: Kufri Bhaskar, heat tolerance, mite and hopper burn, early planting.

INTRODUCTION

Potato (*Solanum tuberosum* L.) plays a vital role in global food and nutritional security and is cultivated across a broad range of agro-ecologies. In India, it is predominantly grown in subtropical regions under short-season conditions, in the Indo-Gangetic plains. As a cool-season crop, the expansion of potatoes into developing countries—especially in tropical and subtropical regions—has raised concerns among producers. This is particularly relevant where average temperatures exceed optimal levels, leading to issues of heat stress (Demirel *et al.*, 2017). This potentially exposes the crop to high temperatures during the initial growth stages, (Minhas *et al.*, 2011; George *et al.*, 2017). This can adversely affect tuber initiation, bulking, delayed canopy development, reduced photosynthetic efficiency, and ultimately poor tuber yields and quality (Levy and Veilleux, 2007; Tang *et al.*, 2018).

The projected increase in global mean temperatures necessitates the development of heat tolerant potato varieties, mainly in lowland and subtropical areas where ambient temperatures exceed the optimum threshold of 20–25°C (Adekanmbi *et al.*, 2024; George *et al.*, 2017). Under such conditions, most of the released varieties showed reduced leaf expansion, disrupted source-sink relationships, suppressed stolon formation, and in severe cases, no tuber initiation (Tang *et al.*, 2018; Demirel *et al.*, 2017). In these instances, crucial physiological indicators—such as reduced canopy temperature, increased leaf chlorophyll retention, and consistent photosynthetic performance—can assist breeders in more effectively identifying heat-tolerant genotypes within their breeding programs. (Demirel *et al.*, 2017; Al Mahmud *et al.*, 2021). Morphophysiological traits like haulm dry weight, stomatal conductance,

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and SPAD value have also been positively associated with tuber yield under heat stress (Demirel *et al.*, 2017). To mitigate the impact of heat stress, breeding strategies should focus on the selection of early maturing, robust canopy architecture, strong root systems, and stable tuberization under fluctuating thermal regimes (George *et al.*, 2018; Subba and Dukpa, 2019). Screening of seedlings and advanced potato clone under stress environments is essential to identify climate-resilient potato genotypes which can withstand higher temperatures. Along with this, genotypes with combined tolerance to heat and foliage-feeding pests are also needed in heat tolerance potato breeding programs. Such traits are essential in any ideal heat tolerant potato variety under fluctuating climatic conditions and minimizing reliance on chemical pest control (Raj *et al.*, 2004).

The development of heat-tolerant varieties by ICAR-CPRI such as Kufri Surya, Kufri Kiran, and Kufri Lima already demonstrated the feasibility of these cultivars suited for early planting and warmer climates (Gupta *et al.*, 2023; Luthra *et al.*, 2020; Minhas *et al.* 2006). These varieties enabled the successful diversification of different cropping systems through the inclusion of potato as a short-duration crop (Singh *et al.*, 2005; Rana *et al.*, 2011). Despite the development of these varieties in the past, temperature variability in the different agroecologies in India demands the continuous development of improved cultivars with enhanced heat tolerance, yield stability, and adaptability (Kumar *et al.*, 2021; Muhie, 2022).

In this context, the development of new heat-tolerant variety, Kufri Bhaskar (HT/11-3), which is specifically aimed at enhancing productivity under early planting and high-temperature conditions in subtropical India. This variety promises to address the challenges posed by rising temperatures and ensure sustainable agricultural practices in our region. *Kufri Bhaskar* was evaluated

across multi-location trials for its adaptability and agronomic performance in the name of advanced clone HT/11-3.

MATERIALS AND METHODS

The heat-tolerant potato variety *Kufri Bhaskar* (advanced clone HT/11-3) was developed through cross between *Kufri Khyati* (short duration variety) and *Kufri Surya* (heat tolerant variety) made in 2010. The true potato seeds (TPS) were initially grown under high-temperature conditions (24°C temperature during day and night) in a glasshouse at ICAR-CPRI, Shimla, and only few clones that formed tubers under heat stress were further selected for clonal advancement. Following this, systematic clonal selection was carried out at the ICAR-CPRI, Regional Station, Modipuram. The clone HT/11-3 was identified in 2011 for its promising performance under high-temperature conditions at glasshouse, followed by five-hill plot evaluation (2012–13), 30-hill plot (2013–14), multi-row trials (2014–15), and replicated yield trials (2015-17) at Modipuram. During replicated trial under irrigated conditions this clone was evaluated at Modipuram under two different planting dates: early planting (September) to evaluate the performance of clone under high temperature stress during crop establishment and tuber initiation, along with this main season planting in the month of October to evaluate its yield potential under optimal conditions.

After its initial evaluation at Modipuram under early planting (September) and main season planting (October), the clone HT/11-3 was introduced in All India Coordinated Research Project (AICRP) on Potato for multilocation trial. These trials were conducted over a three-year period from 2019–20 to 2021–22 at eight locations (each date): Northern plains zone (Hisar, Jalandhar, Pantnagar), Central plains zone (Deesa, Kanpur, Kota and Raipur) and Eastern plains zone (Faizabad and

Kalyani). All the trials were conducted under both 75- and 90-days crop durations except Kota location (only 90 days). The performance of Kufri Bhaskar was compared with national checks Kufri Surya and Kufri Kiran.

At each AICRP location, the trials were conducted in a randomized complete block design (RCBD) with three replications. Each plot consisted of five rows of 3 meters in length, and plant spacing was maintained at 60 cm between rows and 20 cm within rows. Standard agronomic practices were followed uniformly across locations. The performance of HT/11-3 (*Kufri Bhaskar*) was compared against two previously released nationally recognized heat-tolerant check varieties, *Kufri Kiran* and *Kufri Surya*.

Based on consistent superior performance of HT/11-3 under heat-stress conditions, HT/11-3 was recommended for release as *Kufri Bhaskar* during the 40th group meeting of the AICRP (Potato), held at SKUAST, Srinagar, from 7–9 October 2022.

RESULT

Varietal description

Parentage with details of its pedigree

Plant: Tall, plant canopy compact, stem medium-thick, predominantly green, wings poorly developed and straight.



Foliage: Gray green leaves intermediate, leaf width medium, leaflets ovate-lanceolate, leaflet coalescence absent, rachis green, midrib green.

Flower: Flowering medium, inflorescence medium, floral stalk green, floral stalk-pedicle articulation clearly visible and located above

the middle, calyx green, corolla white, corolla shape pentagonal, anther yellow, anther cone normally developed, stylar length longer than stamen column and stigma bi-lobed.

Tubers: Tubers (7-8), ovoid, skin white-cream, eyes shallow, eyebrows normal, flesh cream, texture mealy.

Sprout: Sprout red purple, shape cylindrical, pubescence at sprout base is medium (Fig. 1).

DNA fingerprinting: The fingerprint of clone, HT/11-3 was generated using 2 SSR markers viz., STU and STIKA using a genetic analyzer, ABI 3500. The fingerprints are clearly unique and do not match any of the existing indigenous varieties (Fig 2).

Yield performance

Yield performance in station trials at Modipuram (2014-16)

The advanced clone HT/11-3 was evaluated over three consecutive years (2014–15 to 2016–17) in station trials which were conducted



Fig. 1. Morphological features of *Kufri Bhaskar* (HT/11-3)

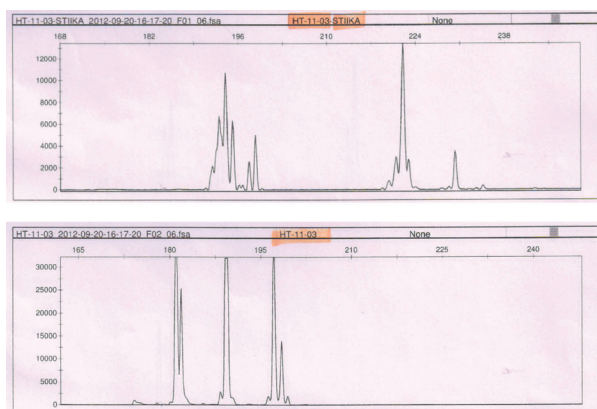


Fig. 2. DNA Fingerprint profile of Kufri Bhaskar (HT/11-3)

at ICAR-CPRI RS Modipuram at 75-day crop duration (Last week of September planting). The genotype HT/11-3 consistently outperformed the national check Kufri Surya in total and marketable tuber yield across all years (Table 1). The mean total tuber yield (TTY) of HT/11-3 was 15.9 t/ha, which was 24.2% higher than Kufri Surya (12.8 t/ha). In 2014, 2015 and 2016, HT/11-3 recorded 36.0%, 16.7% and 26.4% TTY advantage over the Kufri Surya. Along with this, HT/11-3 also exhibited significant superior yield advantage over other check Kufri Lauvkar under high temperature conditions. The mean dry matter content of HT/11-3 was recorded as 16.5% at 75 days crop duration.

Multi-location performance (2019-22) in AICRP trials (75 days)

The advanced clone HT/11-3 was evaluated at eight AICRP centres which represents the northern, central, and eastern

plains over three years (2019–20 to 2021–22) under 75-days and 90 days crop duration (Table 2 and 3). The genotype showed consistent superior performance in total tuber yield across locations compared with national checks Kufri Kiran and Kufri Surya. At 75 days crop duration (Table 2), HT/11-3 showed 33.7 t/ha total tuber yield over eight locations, which was 17.6% and 11.6% higher than Kufri Surya (28.6 t/ha) and Kufri Kiran (30.2 t/ha), respectively. At Deesa location, HT/11-3 recorded highest total tuber yield 42.9 t/ha, as compared to Kufri Surya and Kufri Kiran which exhibited 37.9 t/ha and 36.9 t/ha, respectively. HT/11-3 showed minimum yield of 27.2 t/ha at Jalandhar location but it was still higher from Kufri Surya (26.6 t/ha) and Kufri Kiran (25.1 t/ha). This pattern was also observed in marketable tuber yield where HT/11-3 showed 10.8% and 16.6% yield advantages over Kufri Kiran and Kufri Surya, respectively.

At 90 days crop duration (Table 3), the pooled mean total tuber yield of HT/11-3 was 40.6 t/ha, which was 11.2% and 17.2% higher than Kufri Kiran (36.5 t/ha) and Kufri Surya (34.6 t/ha), respectively. The highest yield of HT/11-3 was recorded at Deesa (50.3 t/ha) and lowest yield at Jalandhar (37.1 t/ha). Except Hissar location where Kufri Kiran (41.6 t/ha) slightly outperform over HT/11-3 (41.4 t/ha), HT/11-3 recorded consistent higher yield in all the locations of Northern, Central and Eastern plains.

Table 1: Performance of HT/11-3 in station trials (early season) at Modipuram (2014-15 to 2016-17)

Genotypes	MTY/ha (75 days)			Mean	TTY/ha (75 days)			Mean	Mean DM%
	2014	2015	2016		2014	2015	2016		
HT/11-3	10.2	17.0	14.5	13.9	11.3	18.1	18.2	15.9	16.5
Kufri Lauvkar	6.9	11.0	7.1	8.3	7.8	12.7	9.2	9.9	17.6
Kufri Surya	7.4	14.4	13.7	11.8	8.3	15.6	14.4	12.8	18.3
CD (0.05)	1.3	2.0	2.1		1.3	2.2	2.3		
Yield increase (%) over Kufri Surya	38.6	18.1	5.8	17.8	36.0	16.7	26.4	24.2	

*TTY – Total tuber yield; MTY – Marketable tuber yield

Table 2: Yield performance of HT/11-3 (Pooled means of 2019-20 to 2021-22) at 75 days in AICRP locations

Regions	Locations	Total tuber yield t/ha			Marketable tuber yield t/ha		
		HT/11-3	K Kiran	K Surya	HT/11-3	K Kiran	K Surya
Northern plains	Hissar	36.6	34.3	32.8	33.9	29.3	28.1
	Jalandhar	27.2	25.1	26.6	25.8	24.0	25.6
	Pantnagar	31.0	27.0	24.5	28.1	24.9	22.3
Central plains	Deesa	42.9	36.9	37.9	41.3	35.4	36.9
	Kanpur	35.4	32.6	29.0	27.4	26.4	23.7
	Raipur	36.6	29.3	30.3	33.4	25.6	25.6
Eastern plains	Faizabad	29.8	29.2	24.8	26.8	26.4	22.5
	Kalyani	29.7	26.9	23.1	24.4	25.4	21.9
Overall mean		33.7	30.2	28.6	30.1	27.2	25.8
Mean yield increase (%)			11.6	17.6		10.8	16.6
CD (0.05)		Var: 0.67; Var Location year: 3.22			Var: 0.73; Var Location year: 3.55		

Table 3: Yield performance of HT/11-3 (Pooled means of 2019-20 to 2021-22) at 90 days in AICRP locations

Regions	Locations	Total tuber yield t/ha			Marketable tuber yield t/ha		
		HT/11-3	K Kiran	K Surya	HT/11-3	K Kiran	K Surya
Northern plains	Hissar	41.4	41.6	37.8	37.3	35.8	32.7
	Jalandhar	37.1	31.5	32.5	34.9	29.4	31.5
	Pantnagar	33.8	29.5	26.8	31.2	27.9	24.7
Central plains	Deesa	50.3	48.6	46.4	49.0	47.2	44.7
	Kanpur	45.7	39.6	34.4	39.9	33.5	28.8
	Kota	34.4	30.0	28.9	33.0	28.9	27.8
	Raipur	41.4	34.7	35.4	37.9	30.6	32.0
Eastern plains	Faizabad	35.0	32.8	29.1	32.2	30.5	27.1
Overall mean		40.6	36.5	34.6	37.6	33.3	31.7
Mean yield increase (%)			11.2	17.2		12.8	18.5
CD (0.05)		Var: 0.94; Var × Location × Year: 4.66			Var: 0.94; Var × Location × Year: 4.6		

Zone-wise performance (Pooled across locations)

The pooled performance of HT/11-3 (Kufri Bhaskar) across the northern, central, and eastern plains during AICRP trials (2019–20 to 2021–22) under the 75- and 90-days crop duration revealed consistent yield advantages over the national checks Kufri Kiran and Kufri Surya (Table 4).

At 75 days in the northern plains, HT/11-3 recorded a total tuber yield (TTY) of 31.6 t/ha and marketable tuber yield (MTY) of 29.3

t/ha, with yield advantage of 9.7% and 12.3% over Kufri Kiran, and 13.0% and 15.5% over Kufri Surya. In the central plains, HT/11-3 exhibited the highest TTY of 38.3 t/ha with a yield advantage of 18.2% over Kufri Surya, and 16.3% over Kufri Kiran. In the eastern plains also Kufri Bhaskar performed better than national checks (Table 4).

At 90 days crop duration, in the northern plains, HT/11-3 recorded a mean TTY of 37.4 t/ha and MTY of 34.5 t/ha and showed yield advantage of 15.7% (TTY) and 16.3% (MTY)

over Kufri Surya, and 9.5% and 11.1% over Kufri Kiran. In the central plains, HT/11-3 exhibited the highest total tuber yield of 43.0 t/ha. It recorded a yield gain of 18.4% over Kufri Surya, and 12.4% over Kufri Kiran. In the eastern plains, HT/11-3 exhibited a total tuber yield of 35.0 t/ha, with 20.3% higher yield over Kufri Surya, and 6.7% over Kufri Kiran (Table 5).

Performance at Modipuram under AICRP trials (75 and 90 days)

The performance of HT/11-3 was evaluated at Modipuram under AICRP trials during 2020–21 and 2021–22, under both 75-day and 90-day crop durations. This genotype consistently outperformed all standard checks used in the study like Kufri Kiran, Kufri

Surya, Kufri Lima, and Kufri Bahar, in total and marketable tuber yield (Tables 6 and 7).

At 75 days (Table 6), HT/11-3 recorded a mean total tuber yield of 23.9 t/ha, which were 8.7% higher than Kufri Kiran (22.0 t/ha), 16% over Kufri Surya (20.6 t/ha), and 21.9% over Kufri Lima (19.6 t/ha). Under the 90-days crop duration (Table 7), HT/11-3 showed similar trend with tuber yield of 25.4 t/ha, which was 7.8% higher than Kufri Kiran (23.7 t/ha) and 18.7% higher than Kufri Surya (21.4 t/ha). Yield advantages over Kufri Lima and Kufri Bahar were 12.4% and 27.7%, respectively. These results indicated the consistent yield superiority of HT/11-3 under both early and full-season conditions at Modipuram.

Table 4: Performance of HT/11-3 in AICRP trials at 75 days (pooled over location)

Regions	HT/11-3 (Kufri Bhaskar)			Kufri Kiran			Kufri Surya		
	TTY	MTY	DM%	TTY	MTY	DM%	TTY	MTY	DM%
Northern plains	31.6	29.3	14.9	28.8	26.1	16.8	28.0	25.3	17.1
	Yield increase (%)			9.7	12.3		13.0	15.5	
Central plains	38.3	34.0	16.1	32.9	29.1	17.6	32.4	28.7	18.2
	Yield increase (%)			16.3	16.6		18.2	18.4	
Eastern plains	29.8	25.6	16.7	28.1	25.9	16.7	24.0	22.2	16.9
	Yield increase (%)			6.1	-1.2		24.2	15.3	
Overall Mean	33.7	30.1	15.8	30.2	27.2	17.2	28.6	25.8	17.6
	Yield increase (%)			11.6	10.8		17.6	16.6	

TTY-Total Tuber Yield, MTY- Marketable Tuber Yield, DM%- Tuber Dry matter content %

Table 5: Performance of HT/11-3 in AICRP trials at 90 days (pooled over location)

Regions	HT/11-3 (Kufri Bhaskar)			Kufri Kiran			Kufri Surya		
	TTY	MTY	DM%	TTY	MTY	DM%	TTY	MTY	DM%
Northern plains	37.4	34.5	16.5	34.2	31.0	18.3	32.4	29.6	18.1
	Yield increase (%)			9.5	11.1		15.7	16.3	
Central plains	43.0	40.0	19.3	38.2	35.1	19.7	36.3	33.3	20.7
	Yield increase (%)			12.4	14.0		18.4	19.9	
Eastern plains	35.0	32.2	19.5	32.8	30.5	20.5	29.1	27.1	20.3
	Yield increase (%)			6.7	5.6		20.3	18.8	
Overall Mean	40.6	37.6	18.5	36.5	33.3	19.4	34.6	31.7	19.9
	Yield increase (%)			11.2	12.8		17.2	18.5	

TTY-Total Tuber Yield, MTY- Marketable Tuber Yield, DM%- Tuber Dry matter content %

Tuber dry matter content

Across AICRP locations, HT/11-3 exhibited moderate dry matter content, with pooled means of 15.8% at 75 days and 18.5% at 90 days (Table 8). The highest dry matter was observed at Raipur (22.4% at 90 days), followed by Kanpur (19.8%) and Faizabad (19.5%). In AICRP trials at Modipuram location, HT/11-3 recorded a mean dry matter content of 17.9% at 75 days and 19.8% at 90

days (Table 9). HT/11-3 has acceptable (16-19%) tuber dry matter content at all locations.

Foliage senescence at Modipuram

HT/11-3 exhibited mean foliage senescence of 52.5% at 75 days and 60.0% at 90 days at Modipuram (Table 10).

Keeping quality and dormancy

HT/11-3 exhibited very good storage

Table 6: Performance of HT/11-3 in AICRP trial at Modipuram at 75 days

Genotypes	Total tuber yield (t/ha)			% Yield increase	Marketable tuber yield (t/ha)			% Yield increase
	2020-21	2021-22	Mean		2020-21	2021-22	Mean	
HT/11-3	20.4	27.3	23.9		19.6	25.9	22.7	
Kufri Kiran	19.5	24.5	22.0	8.7	18.9	22.8	20.8	9.1
Kufri Lima	15.3	23.9	19.6	21.9	14.5	22.3	18.4	23.4
Kufri Surya	17.2	23.9	20.6	16.0	16.5	22.1	19.3	17.6
Kufri Bahar	14.3	18.8	16.6	44.0	13.6	16.9	15.3	48.4
CD (0.05)	1.9	2.7			1.8	2.8		

Table 7: Performance of HT/11-3 in AICRP trial at Modipuram at 90 days

Genotypes	Total Tuber yield (t/ha)			% Yield increase	Marketable Tuber yield (t/ha)			% Yield increase
	2020-21	2021-22	Mean		2020-21	2021-22	Mean	
HT/11-3	22.0	28.8	25.4		20.9	27.6	24.3	
K Kiran	21.6	25.8	23.7	7.8	20.5	24.4	22.5	8.0
K Lima	17.7	27.5	22.6	12.4	16.7	26.3	21.5	13.0
K Surya	19.3	23.6	21.4	18.7	18.3	22.8	20.6	17.9
K Bahar	16.6	23.1	19.9	27.7	15.4	22.3	18.8	29.3
CD (0.05)	1.6	3.1			1.6	3.4		

Table 8: Tuber dry matter (%) of HT/11-3 (Pooled means of 2019-20 -2021-22) in AICRP locations

Regions	Locations	75 days			90 days		
		HT/11-3	K Kiran	K Surya	HT/11-3	K Kiran	K Surya
Northern plains	Hissar	14.8	16.9	16.3	17.5	18.2	17.8
	Jalandhar	15.0	16.7	17.8	15.5	18.3	18.4
Central plains	Deesa	15.1	17.2	18.7	17.4	20.5	22.5
	Kanpur	14.7	16.0	16.9	19.8	18.8	20.2
	Raipur	18.4	19.5	19.1	22.4	21.7	22.2
	Kota	-	-	-	17.7	17.8	17.9
Eastern plains	Faizabad	16.7	16.7	16.9	19.5	20.5	20.3
Overall mean		15.8	17.2	17.6	18.5	19.4	19.9
CD (0.05)		Var: 0.21; Var × Location × Year: 0.88			Var: 0.18; Var × Location × Year: 0.84		

Table 9: Tuber dry matter of HT/11-3 in AICRP trial at Modipuram

Genotypes	75 days			90 days		
	2020-21	2021-22	Mean	2020-21	2021-22	Mean
HT/11-3	17.4	18.4	17.9	19.4	20.1	19.8
K Kiran	20.3	17.6	19.0	21.5	21.4	21.5
K Lima	18.8	16.3	17.6	22.1	18.4	20.3
K Surya	20.0	20.5	20.3	21.1	22.0	21.6
K Bahar	20.0	19.9	20.0	19.2	20.5	19.9

Table 10: Foliage senescence of HT/11-3 in AICRP trial at Modipuram

Genotypes	75 days			90 days		
	2020-21	2021-22	Mean	2020-21	2021-22	Mean
HT/11-3	65.0	40.0	52.5	70.0	50.0	60.0
K Kiran	60.0	40.0	50.0	70.0	45.0	57.5
K Lima	50.0	30.0	40.0	55.0	40.0	47.5
K Surya	65.0	45.0	55.0	70.0	50.0	60.0
K Bahar	70.0	50.0	60.0	80.0	80.0	80.0

Table 11: Keeping quality of HT/11-3 at Modipuram during 2014-16

Genotypes	Dormancy	Sprouting (%)		Weight loss due to Sprout (%)	Wight loss due to rottage (%)	Total weight loss (%)
		45 days	75 days			
HT/11-3	>10 weeks	24.6	34.5	0.1	0.3	11.1
K. Lauvkar	>10 weeks	46.9	55.7	0.2	0.0	8.9
K. Surya	> 10 weeks	12.5	28.0	0.0	0.0	9.9

Table 12: Mite and hopper tolerance of HT/11-3 in station trials at Modipuram

Genotypes	% Mite burn			Mean	%Hopper burn			Mean
	2014	2015	2016		2014	2015	2016	
HT/11-3	10.0	18.3	15.0	14.4	0.0	0.0	1.0	0.3
K. Lauvkar	50.0	80.0	38.3	56.1	0.0	0.0	20.0	6.7
K. Surya	15.0	30.0	16.7	20.6	0.0	0.0	1.7	0.6

behaviour with a dormancy period exceeding 10 weeks, similar to the check variety Kufri Lauvkar and Kufri Surya (Table 11). Sprouting % in HT/11-3 was 24.6% at 45 days and 34.5% at 75 days, higher than Kufri Surya (12.5%, 28.0%) and lower than Kufri Lauvkar (46.9%, 55.7%). Total weight loss in HT/11-3 during storage was 11.1%, which is comparable to other genotypes.

Tolerance to mite and hopper burn

In our station trials, HT/11-3 exhibited moderate tolerance to mite infestation, with a mean foliage damage of only 14.4% (Table 12). In the same trial check variety Kufri Lauvkar and Kufri Surya showed 56.1% and 20.6%, mite infestation. For hopper burn also, HT/11-3 showed very little damage (0.3%) across all three years, which were lower as compared to Kufri Surya (0.6%) and Kufri Lauvkar (6.7%).

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest

ETHICAL STATEMENT

This article does not contain any studies with human participants or animals performed by any of the authors

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