



ICAR – Central Potato Research Institute

Newsletter

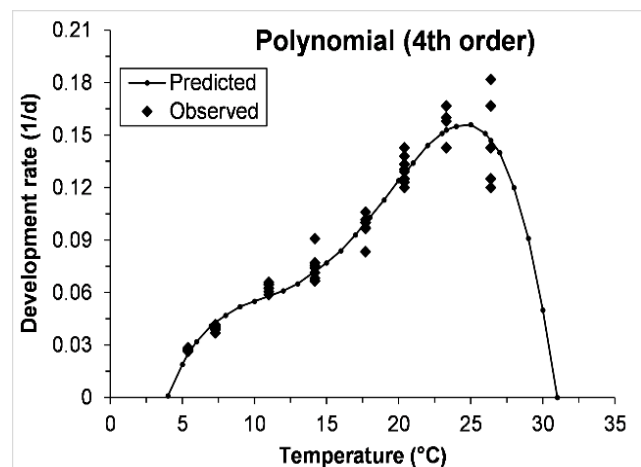
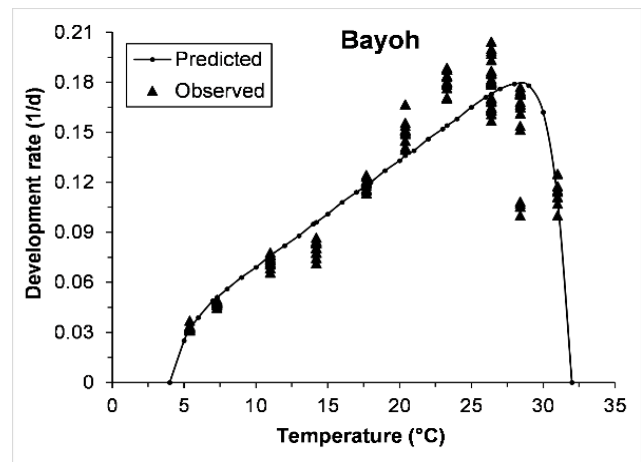
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Research Highlights

Temperature thresholds and thermal requirement for the development of peach-potato aphid, *Myzus persicae* (Sulzer) on potato

Insects are poikilothermic, therefore, temperature plays a major role in determining their phenology, survivorship, abundance and distribution. Evaluation of temperature dependent development and survival of peach potato aphid, *Myzus persicae* (Sulzer) was done on potato (*var.* Kufri Jyoti) at various constant temperatures in growth chambers. *M. persicae* developed to adult stage from 5.4°C to 31°C but failed to achieve adult emergence at 32°C, the highest temperature tested. However, winged adults were formed from 5.4°C to 26.4°C only, and no winged morphs developed at 28.4°C and above. In both apterae and alatae, mean developmental time decreased with increasing temperature up to 23.3°C, and increased after that. The developmental time of alatae was higher than the apterae at all the tested temperatures; the gap was wider at lower temperatures. The difference in developmental times was 1.2 days at 26.4°C and 6.1 days at 5.4°C. *M. persicae* immatures survived till adult eclosion at all the tested temperatures except at 32°C. The survival percentage was above 87% from 7.3 to 26.4°C while considerably lower survival was noted at 5.4°C (34.83 ± 3.35) (mean % ± SE), 28.4°C



Fitted non-linear models for temperature dependent development rate (1/day) of apterae (top) and alatae (down) of *M. persicae* (50.49 ± 8.23) and 31°C (7.28 ± 1.88). At the highest temperature tested (32°C), the 1st instar nymphs lived for a maximum of 2 to 3 days. The general linear model estimated the lower temperature threshold (T_{min}) as 4.13 ± 0.38°C and 4.35 ± 0.74°C

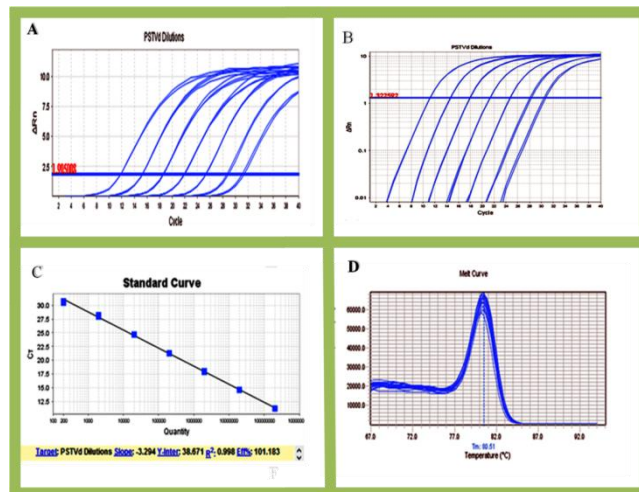
for apterae and alatae, respectively. The thermal constants (K, degree days-DD) were estimated at 108.69 ± 3.07 DDs for apterae, and 128.20 ± 7.06 DDs for alatae. Among the non-linear models, the Janisch model followed by Polynomial (4th order) model were found as best fit based on AIC, RSS and biological criteria. Thermal optimum (optimum temperature for development) estimation for complete development ranged from 24.5°C to 28.25°C for the apterae, and from 24.5°C to 28.46°C for alatae. The estimates of upper temperature threshold for development (T_{max}), based on the fitted non-linear models, were estimated as 31.6°C for apterae and 28.5°C for alatae.

*Mohd Abas Shah, V K Dua, Sanjeev Sharma
R K Singh & Raj Kumar*

Standardization and melt curve analysis of quantitative PCR method for detection of Potato spindle tuber viroid infecting potato

The necessity of fast, sensitive, and specific methods to detect pathogens is important to improve decision making in disease control. Quantitative real-time PCR (qPCR) technology allows accurate detection and/or quantification of pathogens is presented at low inoculum load in samples. It is considerably faster than conventional RT-PCR, less prone to operator error and more convenient as the PCR amplification and detection are all carried out in one machine. The use of a closed system for amplification and detection minimises the potential for amplicon carryover contamination. Presently a sensitive and rapid assay was developed to detect PSTVd in potato leaf samples which can be applied for routine diagnosis as well as for viroid quantification. For optimization and standard curve preparation of the assay, a recombinant plasmid targeting genome of PSTVd (*pPSTVd::pCR4TOPO*) was constructed.

Melting curve analysis indicated no primer-dimers and non-specific products in the assay. The initial stock of plasmid DNA was 10 fold serially diluted and estimated copy number was determined ranges from 2×10^8 to 2×10^2 copies/ μl . The average Cq values (triplicates) of each dilution in a real-time PCR reactions yielding 11.17 ± 0.02 - 30.57 ± 0.20 and in negative control which is de-voiding of template, the Cq remains undetermined. The amplification curves shifted to the right as the initial amount of the plasmid was reduced (A and B). The correlation between the Cq and the amount of target template showed excellent linearity with an high coefficient of determination ($y = -3.294x + 35.377$, $R^2=0.998$) demonstrating that the assay has a dynamic range of at least 7 logs and is capable of detecting as few copies in the PCR reaction (C). We observed a PCR efficiency of 101.18 % which is an indication of good qPCR assay. In order to analyze specificity of qPCR assays, the use of SYBR green chemistry provides this opportunity to generate a melt curve which revealed specific product amplification during real time PCR. A single melt peak of each dilution (triplicates) with a T_m value of $\sim 80.51^{\circ}\text{C}$ (D) was observed. The developed



Standardization and melt curve analysis of qPCR method for PSTVd

qPCR assay is rapid, sensitive and could augment the laboratory diagnosis of PSTVd in potato.

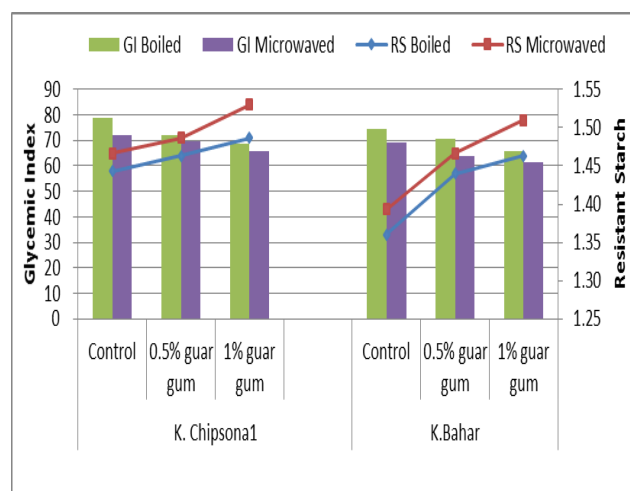
*Gaurav Verma, Baswaraj Raigond,
Kailash C. Naga & Sanjeev Sharma*

Blending of guar gum with cooked potatoes help to decrease glycemic index

Due to lack of low glycemic index (GI) potato varieties at national level, there is a need to find out processing/cooking methods that may help to reduce GI of cooked potatoes. Guar gum is a good source of dietary fibre that acts as a sponge to absorb water in the intestine, and thereby slows down the rate of digestion and absorption. Addition of guar gum (0.5% and 1% w/w) to cooked potatoes (boiled, microwaved) was tried to evaluate the influence of guar gum on resistant starch (RS) and glycemic index (GI). Guar gum showed concentration dependent increase in RS content. Increase in RS after guar gum addition was more in K. Bahar. Increase in RS in boiled tubers of K. Chipsona 1 and K. Bahar was 1% and 6%, respectively at 0.5% guar gum concentration, whereas at 1% guar gum concentration, the

increase was 3% and 7% respectively. Microwaved tubers also showed similar trend with 1% and 6% increase at 0.5% concentration and 4% and 9% increase at 1% guar gum concentration in K. Chipsona 1 and K. Bahar, respectively.

It is well known that GI is inversely proportional to RS content. In line with that, along with increase in RS, addition of guar gum reduced the GI of boiled and microwaved potatoes. Glycemic index was high in boiled and microwaved potatoes (70 and above), addition of guar gum showed concentration dependent decrease in GI. Addition of guar gum at 0.5% concentration to boiled potatoes though reduced the GI in both the varieties, but the GI class remained the same (i.e high GI). However, addition of guar gum at 1% concentration to boiled potatoes reduced the GI class from high (70 and above) to medium (56-69) in both the varieties. Microwaved potatoes exhibited lower GI compared to boiled potatoes. Guar gum addition at 1% concentration reduced the GI of microwaved potatoes from high to medium class in case of K. Chipsona 1. GI of microwaved potatoes of varieties K. Bahar also decreased with increasing concentration of guar gum, but GI class remained the same. The results showed that the addition of ingredients that increase the viscosity of cooked potatoes may help to attain low GI. Further studies with higher concentration of guar gum and other safe ingredients; and their impact on organoleptic properties needs to be carried out that will help to give a processing recommendation for consumption of potatoes with low GI.



Effect of guar gum addition on resistant starch content and glycemic index of cooked potatoes

*Nitasha Thakur, Pinky Raigond, M K Lal,
V Parmar, S S Changan, D Kumar, Som Dutt,
Arvind Jaiswal & Brajesh Singh*

Method development for *in-vitro* screening of salinity tolerance in Potato

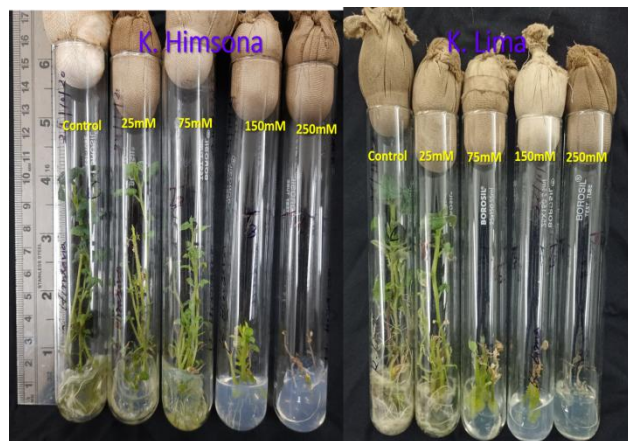
MS basal medium (Murashige and Skoog 1962) was supplemented with NAA (2.5 μM), BA (4.2 μM) and GA3 (1.37 μM) and 32g l^{-1} sucrose. Different modification of Mukherjee 2001 for NAA, BA and GA3 was done but concentration of NAA (2.5 μM), BA (4.2 μM) and GA3 (1.37 μM) and 32g l^{-1}



Root length and growth at different NaCl concentration

¹ sucrose was found suitable to induce stress in potato genotypes. For inducing salinity various modifications of different concentrations of NaCl were followed. The different combinations of concentration which were tested were 10mM, 20 mM, 25 mM, 40 mM, 60 mM, 75 mM, 80 mM, 100 mM, 150 mM and 250 mM. Different concentration of NaCl was added to modify MS media and the pH was adjusted to 5.7 ± 1 . After the adjustment of pH the tubes containing modified MS media was sterilized at 105kPa in steam autoclave for 15 mins. For standardizing the method for *in vitro* salinity tolerance, 10 different genotypes of potato were used. Nodal cuttings of these genotypes were surface sterilized in 0.1% mercuric chloride solution for 1-2 mins followed by washing in double distilled water. After sterilization these cuttings were placed in test tubes containing 10 ml of modified MS media having different

concentrations of NaCl (10 levels). For each genotype three replications for each stress level



Kufri Himsona and Kufri Lima at different salt concentration.

was followed. So, in total 10 treatment combination with three replications was followed. These cultures were maintained at $25 \pm 2\text{C}$ with 16/8 h light/dark cycle for 5 weeks. After 5 weeks growth parameters and morphological characters were recorded and it was confirmed that MS basal medium supplemented with NAA (2.5 μM), BA (4.2 μM) and GA₃ (1.37 μM), 32g l^{-1} sucrose and 75 mM NaCl concentration was best for screening genotypes for salinity tolerance in potato since, growth of root as other parameters was significantly hindered as compared to control.

10 varieties of potato were screened for salinity under *in vitro* conditions at four level of salinity stress *viz.*, 25, 75, 150 and 250 mM NaCl concentration. None of the varieties except one survived and in all senescence, wilting and drying of explant occurred at 250 mM NaCl concentration. Kufri Surya showed partial rooting at this concentration whereas, delayed senescence was observed in Kufri Jyoti but there was no rooting initiation after 5 weeks. At 150mM concentration most of the varieties showed partial rooting initiation except Kufri Ganga, Kufri Garima and Kufri Lima. All the 10 varieties *viz.*, Kufri Himsona, Kufri Ganga, Kufri Surya, Kufri Pukhraj,

Kufri Chipsona1, Kufri Sadabahar, Kufri Garima, Kufri Lima, Kufri Jyoti and Kufri Gaurav showed rooting after 5 weeks at 75 mM concentration. Based on 50% reduction in growth parameters Kufri Himsona was found to be tolerant to salt concentration.

*Kumar Nishant Chourasia, R K Tiwari, M K Lal,
Dharmendra Kumar & Vinay Bhardwaj*

Transfer of Technology

Advisory through messages under MGMG

During the period timely advisory to the farmers were sent for their crop operation scheduling. Messages regarding intercultural schedule and control of powdery mildew in peas were sent in time. Spraying of insecticides in the temperate fruits and later pruning of apple trees and other stone fruit trees were also sent which were necessary for winters. This was also the time to lay cabbage and cauliflower nursery therefore, messages regarding management and treatment of nursery of these crops and on growth protecting it from frost were also sent in time. In the prevailing situation of the COVID-19 pandemic, advisory messages regarding safety and other measures for containing the virus and installing of AAROGYA SETU app and its functioning were also sent for the protection of the farmers. In all 16 advisory messages were sent during the period which helped the farmers to undertake necessary and timely action for their crops.

Live Phone-in Programme at Doordarshan

Scientists from ICAR-CPRI, Shimla participated in the live phone programme during Oct-Dec., 2020. The detail of the topic alongwith experts are given below:

Month	Topics	Name of the Expert
October, 2020	Potato varieties for plains of Himachal and their sowing	Dr. Vinod Kumar Dr. Jagesh K Tiwari
November, 2020	Intercultural operations and control of weeds in potato crop	Dr. Jagdev Sharma Mr. P Chaukhende
December, 2020	Management of insect pest and disease in potato	Dr. Ravinder Kumar Dr. B Raigond

Important Meetings, Events & Visitors

Institute Management Committee meeting held at Shimla

Institute Management Committee was held at ICAR-CPRI, Shimla on 7th December, 2020. Dr. Manoj Kumar, Director, ICAR-CPRI, Shimla chaired the meeting. Dr. Naresh Kr. Badhan, Director (Ag.) HP Govt., Dr. Kallol Pramanick, Head, IARI Regional Station, Shimla, Sh. Rajesh Kr. Garg and Sh. Devender Thakur Koonpuri, Farmer members attended the meeting at the Institute whereas other three external members viz., Dr. Arjun Kr. Saini, DG, Horticulture, Haryana, Sh. Jagdish Chander, FAO, IIWBR, Karnal and Dr. Vijay Mahajan, Pr. Scientist, ICAR-Directorate of Onion & Garlic Research, Pune attended the meeting through virtual platform. Dr. Brajesh Singh, Head; Sh. Raj Kumar, SF&AO and



Sh. Sandeep Singh Dudi, AO, ICAR-CPRI, Shimla attended this meeting as Special Invitees to provide vital inputs to the IMC. Dr. Manoj Kumar welcomed all the invitees of this meeting and in his address, he stressed upon taking all such measures and initiatives in consideration which can lead to benefit of the Institute and its staff. In this meeting, various issues were discussed like confirmation of the proceedings of the Institute Management Committee meeting held on 24th March., 2020 at ICAR-CPRI, Shimla and action taken report, Replacement of two more medical practitioners to act as AMA's for the medical treatment in respect of employees of ICAR-CPRI, Shimla for the year 2020-21, Allotment of vacant Type 1 quarters to RA/SRF/JRF etc hired under various projects, Reservation of Type 5 quarter for CAO in accordance to ICAR House allotment rules, approval for change of usage of 12 Nos. (Type-I&II) old residential quarters at ICAR-CPRI, RS, Modipuram & to utilize them for other purposes such as seed storage etc. and discussion was held on outstanding audit paras. The meeting ended with vote of thanks by Dr. Pankaj Kumar, CAO & Member Secretary, ICAR-CPRI, Shimla.

Vigilance awareness week 2020 observed

Vigilance awareness week was observed at ICAR-CPRI, Shimla and its regional stations from 27th October to 02nd November, 2020. On the first day i.e. 27th October, the entire staff of the institute took oath of integrity and pledged to fight against corruption. During the week a number of competitions were organized for the staff of the institutions in which the staff members took part with great enthusiasm. On 28th October an essay competition was organized, on 29th October a debate competition was organized and on 31st October a quiz competition was organized. All these competition had a common theme of corruption eradication and a vigil on offensive activities. On 2nd November the week long observation came to an end with the concluding ceremony which was presided over by Sh. Vijay



Sharma, DSP, State Vigilance & Anti-Corruption Bureau, HP. In his address he emphasized upon being vigilant all the time on the workplace and be aware of laws, rules and compliance mechanism in the conduct of our official work. On this occasion Dr. Manoj Kumar, Director and Dr. Pankaj Kumar, CAO also addressed the staff and conveyed that we shall practice ethical work and commit to good governance based on transparency and fairness. Dr. NK Pandey, Institute Vigilance Officer, CPRI in his address told the staff to be vigilant and uphold high standards of honesty and integrity. The winners of the competitions held during the said week were awarded with certificates and mementoes for their efforts.

Swachhta pakhwara celebrated at ICAR-CPRI, Shimla

Swachhta Pakhwara was celebrated in the institute during 16 to 31 December, 2020. It started with an





oath taking ceremony on 16th December regarding keeping our surrounding clean be it our home, workplace or neighborhood thereby contributing in the cleanliness in the entire nation. Along with regular cleanliness drives during the period, certain special actions were also undertaken like on 22nd December a plantation drive was undertaken in which the staff of the institute planted flowers and other plants in the garden of the institute. On 23rd October a lecture on the importance of cleanliness was delivered to the supporting staff who generally contributes more and holds the responsibility of cleaning by Sh. SS Dudi, AO. Also a feedback was taken from them. Altogether it was an interactive session.

As a part of the concluding of Swachhta Pakhwara celebration of the institute, one full day cleanliness drive was organised at the institute and its regional stations on 30th December. On this occasion Smt. Satya Kaundal, Mayor MC, Shimla was the chief guest along with Sh. Puran Chand, Councillor of Khalini ward as guest of honour. The celebration started with cleaning of the institute and its nearby areas as well as the roads connecting the institute. They also contributed in the cleanliness and also visited the lower lab area of the institute for inspection purpose. The mayor praised the staff for the upkeep of the institute. The function ended with a speech of the director towards maintaining cleanliness in the daily routine.

Human Resource

Technical Promotions

1. Dr. Vineet Sharma, Sr. TO, ICAR-CPRI, RS, Modipuram promoted to ACTO from 30.7.2019.
2. Dr. YP Singh, Sr. TO, ICAR-CPRI, RS, Gwalior promoted to ACTO from 18.6.2019.
3. Sh. Arjun Dass, Technician, ICAR-CPRI, Shimla promoted to Sr. Technician from 31.3.2020.
4. Sh. Mansha Ram, Technician, ICAR-CPRI, Shimla promoted to Sr. Technician from 31.3.2020.
5. Sh. Narendra Kumar, Sr. Technician, ICAR-CPRI, RS Patna promoted to Tech. Asstt., Sr. Tech. Asstt. and Tech. Officer respectively w.e.f. 03.12.2009, 03.12.2014 and 03.12.2019.
6. Sh. Parveen Kumar, Sr. Tech. Asstt. ICAR-CPRI, RS, Jalandhar promoted to TO w.e.f. 07.03.2020.

Administrative

Transfers

1. Sh. Pradyuman Kumar Saraswat, UDC relieved from ICAR-CPRI, RS, Gwalior w.e.f. 06.10.2020 and Joined at ICAR-CPRI, RS, Modipuram on 09.10.2020.

Skilled Supporting Staff

Transfers

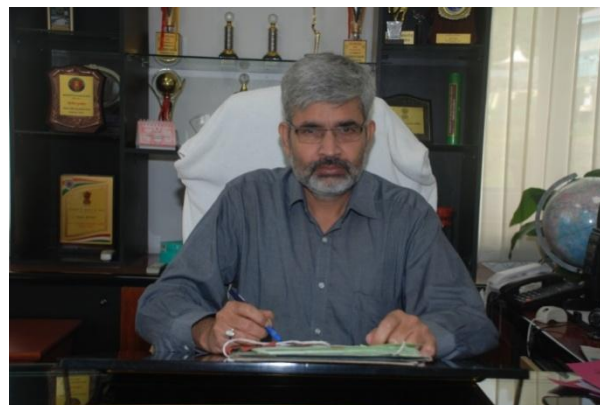
1. Sh. Hira Singh, SSS, ICAR-CPRI, Shimla relieved on 23.11.2020 & joined on 24.11.2020 at ICAR-CPRI, Kufri-Fagu Unit.

Retirements

1. Sh. Satnam Singh, SSS, ICAR-CPRI, RS, Jalandhar retired on 31.10.2020.
2. Smt. Sodha Devi, SSS, ICAR-CPRI, RS, Kufri retired on 30.11.2020.

From the Director's Desk

In recent times many people especially urban residents wish to produce part of their vegetables/salads under their supervision due to the terror of COVID like pandemic situation and excessive application of insecticides /pesticides /fungicides etc. Various systems are commercially available which can be adopted for growing own vegetables but all have some limitations. Considering urban lifestyle and available space, ICAR-CPRI has developed the concept of VEGFAST.



VEGFAST is a technology for growing safe fresh vegetables, fruits, herbs, medicinal plants and flowers in limited space such as on rooftops, balconies, open porch and backyards. The beauty of this technology is that urban residents can enjoy the pleasure of harvesting their own grown vegetables and fruits. VEGFAST helps in converting the concrete jungles into greenery and provides a new way to create a hobby by which a family can reduce their stress level by spending some time with nature. It also helps your kids in learning how the vegetables/plants are cultivated which they consume throughout their life. Families and kids can enjoy the close proximity of nature. ICAR-CPRI provides training to the entrepreneurs to act as service providers of VEGFAST system, which will further help in installing this system in end user's houses, schools, restaurants, balconies and rooftops. This technology has been licensed to 34 service providers pan India. In VEGFAST concept, the service providers are trained to install the troughs with appropriate soil mix and shift the stage-1 plants in the troughs so that, the end-users can enjoy the green beauty of their vegetable garden on day one.

To prevent the unauthorized use of this technology five unique designs of this technology have been protected under the Indian patent act. Besides this ICAR-Central Potato Research Institute (ICAR-CPRI), Shimla registered a trademark “VEGFAST घर पर उगाएँ, ताज़ा खाएँ” for this technology.



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