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B.P. Pal: The Wheat Breeder Before the Green Revolution

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B.P. Pal: The Wheat Breeder Before the Green Revolution

Benjamin Peary Pal bred wheat that could resist rust, a disease that cut yields. He later led India's top farm-research bodies. This lesson covers his career, the NP809 wheat, his part in the Green Revolution and honours.

At a glance

Four key facts on this topic

01 **1950**He became the first Indian Director of IARI.

02 **1965**He became the first Director-General of ICAR.

03 **NP809**A wheat resistant to three rusts at once.

04 **1972**He was elected a Fellow of the Royal Society.

The scientist and his wheat

1 Who was B.P. Pal?

1.1 When and where was he born?

Benjamin Peary Pal was born on 26 May 1906 at Mukandpur in Punjab. His father moved to Burma, then a British colony, to work as a medical officer. Pal studied at St. Michael's School in Maymyo, Burma. The school was known for a beautiful rose garden.

1.2 How was he educated?

In 1929 he passed the Master's in Botany at Rangoon University. He won the Matthew Hunter Prize there. It went to the top student across all science streams.

He then earned a PhD in plant genetics from Cambridge in 1933. At Cambridge he worked with Sir Frank Engledow on hybrid vigour in wheat.

1.3 What is hybrid vigour?

Hybrid vigour is the extra strength a cross-bred plant shows over its parents. A self-pollinated crop fertilises its own flowers. Wheat is one.

Pal's PhD showed that hybrid vigour can be used even in such a crop. His finding paved the way for using it in rice and wheat.

> 9. **Think it through:** Why does a Cambridge PhD matter for the wheat story? See answer ↓

> **Quick check 1.** True or false: Pal earned his PhD at Cambridge. *(True or False?)* See answer ↓

Sources: istampgallery.com; teriin.org

2 Career at Pusa and Delhi

2.1 How did his career begin?

In March 1933 Pal became Assistant Rice Research Officer in the Burmese Department of Agriculture. In October 1933 he joined the Imperial Agricultural Research Institute at Pusa, Bihar. His post there was Economic Botanist.

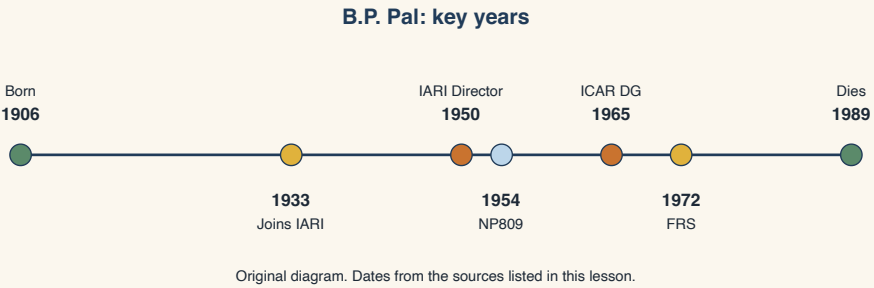
In 1937 he became Head of its Division of Botany. The institute was renamed the Indian Agricultural Research Institute (IARI) in 1947.

2.2 Why did IARI move to Delhi?

A severe earthquake damaged its main building at Pusa in Bihar. The institute was shifted to New Delhi in 1936. The Delhi campus was also named Pusa.

2.3 What were his two top posts?

In 1950 Pal became the first Indian Director of IARI in New Delhi. He held that post until May 1965. Then he became the first Director-General of the Indian Council of Agricultural Research (ICAR). He stayed in that post until January 1972.



Original diagram. Dates from the sources listed in this lesson.

Original diagram: Pal's career on one line. The 1954 date for NP809 rests on one source.

Two 'firsts' that are easy to mix up

Post	Body	Year he started	Until
First Indian Director	Indian Agricultural Research Institute (IARI), New Delhi	1950	May 1965
First Director-General	ICAR, the national council	May 1965	January 1972

Source: R. K. Pachauri, 2006 (TERI site).

10. **Think it through:** Are IARI and ICAR the same body? See answer ↓

Quick check 2. True or false: Pal was the first Director-General of ICAR. *(True or False?)* See answer ↓

Quick check 3. True or false: IARI moved to New Delhi in 1936 after an earthquake. *(True or False?)* See answer ↓

3 Rust-resistant wheat

3.1 What is rust?

Rust is a plant disease. Pal saw that rust was largely responsible for low wheat yields. So he built a systematic breeding method to produce rust-resistant varieties. Breeding means crossing plants to get better offspring.

3.2 What is NP809?

NP809 is a wheat variety that Pal helped to breed. It was the first variety in the world with resistance to stem, leaf and stripe rusts at the same time. Those are three kinds of rust.

One source dates its release to 1954. The other pages we read do not give a year.

> 11. **Think it through:** Why is ‘all three at once’ the point? See answer ↓

3.3 Did he breed anything besides wheat?

Yes. Pal also bred many beautiful varieties of roses and bougainvilleas.

> **Quick check 4.** True or false: NP809 was the first wheat variety in the world resistant to all three rusts at once. *(True or False?)* See answer ↓

Quick check 5. True or false: NP809 is best known as a dwarf wheat from Mexico. *(True or False?)* See answer ↓

Sources: neglectedscience.com

The Green Revolution and his institutions

4 Pal and the Green Revolution

4.1 What was the food crisis?

In the late 1960s India faced a major food crisis. It was seen as a country of starving people. The Green Revolution changed that picture. India moved from receiving gifts of foodgrain, largely from the US, to exporting food.

4.2 What was Pal's part?

His own work was in wheat genetics and breeding. R. K. Pachauri wrote that the Green Revolution was conceptualised and launched under Pal's leadership. Norman Borlaug called Pal the architect of India's Green Revolution.

The India Post folder names his 'symphony approach' to farm research as a help in launching it in the mid-sixties.

4.3 Who is called its father?

Exam questions usually name M.S. Swaminathan as the father of the Green Revolution in India. Read his lesson too. Pal's credit is different. He led the research system and bred the rust-resistant wheat.

12. **Think it through:** Can two people both get credit? See answer ↓

Quick check 6. True or false: Norman Borlaug called Pal the architect of India's Green Revolution. *(True or False?)* See answer ↓

5 Institutions and societies

5.1 What did he build for research and teaching?

- **Post-graduate school:** he set one up at IARI in 1958.
- **Research projects:** he was the prime architect of the All-India coordinated research projects.
- **Universities:** he fostered agricultural universities in all parts of the country.
- **Education report:** he was principal author of the ‘Education for Agriculture’ chapter in the Kothari commission report.

5.2 Which societies did he found?

He founded the Indian Society of Genetics and Plant Breeding. He edited its journal for 25 years. He was also the founder President of the Rose Society and the Bougainvillea Society.

5.3 What was his 'research for new genes'?

Pal made a plea for a research for new genes. It came about 70 years before 2008. It led to a global movement for conserving and enhancing genetic resources. Genetic resources are the crop varieties that breeders may need.

5.4 What did he do after ICAR?

He chaired the National Committee on Environmental Planning and Coordination.

> **Quick check 7.** True or false: Pal founded the Indian Society of Genetics and Plant Breeding. *(True or False?)* See answer ↓

Sources: organiser.org; isgpb.org

Honours and legacy

6 Honours and last years

6.1 Which honours did he win?

- **Padma Shri:** 1958.

- **Padma Bhushan:** 1968.
- **Padma Vibhushan:** the sources we read do not give the year.
- **Royal Society:** elected a Fellow in 1972.
- **Academies:** the stamp folder also names the Japan Science Academy and all major Indian science academies.

The Padma Awards list for 1954 to 2017 shows the Padma Shri under 1958 and the Padma Bhushan under 1968.

6.2 How is he remembered?

India Post issued a stamp for his birth centenary on 5 January 2008. Pal died on 14 September 1989. He had spent nearly 60 years in agricultural research and education. He gave all his belongings, including two houses in Delhi and Simla, to IARI.

> 13. **Think it through:** Which award is highest of the three? See answer ↓

> **Quick check 8.** True or false: Pal received the Padma Shri in 1958. *(True or False?)* See answer ↓

Sources: mha.gov.in

Exam Practice

7 How exams test this

7.1 Which facts are asked most?

- **Two firsts:** first Indian Director of IARI (1950) and first Director-General of ICAR (1965).
- **NP809:** resistant to stem, leaf and stripe rusts together.
- **Societies:** genetics, roses and bougainvillea.
- **Honours:** FRS 1972; Padma Shri 1958; Padma Bhushan 1968.

7.2 Which mix-ups come up?

- **Pal against Swaminathan:** read whose name the question wants.
- **IARI against ICAR:** an institute against the national council.
- **One rust against three:** NP809 resisted all three.

Remember this

- **Born:** 26 May 1906, Mukandpur, Punjab. Died 14 September 1989.
- **Posts:** IARI Director from 1950; ICAR Director-General from 1965.
- **Wheat:** NP809 resisted three rusts at once.
- **Societies:** genetics journal, roses, bougainvillea.
- **Honours:** Padma Shri 1958, Padma Bhushan 1968, FRS 1972.

Explain it back: Say which two posts Pal held first among Indians. Then say what rust did to wheat.

Practice MCQs

1. B.P. Pal's team released the wheat variety NP 809 in 1954. What made it significant?

A. It was the first wheat variety anywhere resistant to all three rust diseases at once

B. It was the first dwarf wheat variety grown in India

C. It was the first wheat variety developed using imported Mexican germplasm

D. It doubled India's average wheat yield per hectare overnight

See answer ↓

2. In 1965, B.P. Pal became the first person to hold which position at ICAR?

A. Union Agriculture Secretary

B. Director General

C. Chairman of the Governing Body

D. Vice-President

See answer ↓

3. Besides food-crop genetics, B.P. Pal founded societies dedicated to which two ornamental plants?

A. Roses and bougainvillea

B. Tulips and chrysanthemums

C. Marigolds and jasmine

D. Orchids and lotuses

See answer ↓

4. In which year did B.P. Pal become the first Indian Director of the Indian Agricultural Research Institute (IARI) in New Delhi?

A. 1936

B. 1947

C. 1965

D. 1950

See answer ↓

5. Which Padma award did B.P. Pal receive in 1968?

A. Padma Shri

B. Padma Bhushan

C. Bharat Ratna

D. Padma Vibhushan

See answer ↓

Answer Key

1. **A.** The correct answer is **the first wheat variety anywhere resistant to all three rust diseases at once**. NP809 resisted stem, leaf and stripe rusts together. The 'first dwarf wheat variety' option is wrong because NP809 is known for rust resistance, not height. The 'imported Mexican germplasm' option is wrong because the sources do not describe NP809 that way. The 'doubled yields overnight' option is wrong because no source claims it. Memory hook: NP809 means three rusts, one wheat. ↑ Q1
2. **B.** The correct answer is **Director General**. Pal became the first Director-General of ICAR in May 1965 and served until January 1972. The 'Union Agriculture Secretary' option is wrong because that is a ministry post, not the ICAR post he held. The 'Chairman of the Governing Body' option is wrong because the sources do not give that title. The 'Vice-President' option is wrong for the same reason. Memory hook: IARI Director in 1950, ICAR Director-General in 1965. ↑ Q2
3. **A.** The correct answer is **roses and bougainvillea**. Pal was the founder President of the Rose Society and the Bougainvillea Society, and he bred varieties of both. The 'orchids and lotuses' option is wrong because he is not linked to those societies. The 'marigolds and jasmine' option is wrong for the same reason. The 'tulips and chrysanthemums' option is wrong for the same reason. Memory hook: a wheat breeder who also loved roses. ↑ Q3
4. **D.** The correct answer is **1950**. Pal became the first Indian Director of IARI in New Delhi in 1950 and served until May 1965. The 1936 option is wrong because that is when IARI moved from Pusa, Bihar, to New Delhi. The 1947 option is wrong because that is when it was renamed the Indian Agricultural Research Institute. The 1965 option is wrong because that is when Pal became ICAR's first Director-General. Memory hook: 1950 IARI, 1965 ICAR. ↑ Q4
5. **B.** The correct answer is **Padma Bhushan**. The Padma Awards list for 1968 shows Pal among the Padma Bhushan awardees. The Padma Shri option is wrong because he received that earlier, in 1958. The Bharat Ratna option is wrong because no source lists it among his honours. The Padma Vibhushan option is wrong because it is a higher award. The sources we read give no year for it. Memory hook: Shri 1958, Bhushan 1968. ↑ Q5

Quick-check answers

1. **True.** He took a PhD in plant genetics at Cambridge in 1933. ↑ 1
2. **True.** He held the post from May 1965 to January 1972. ↑ 2
3. **True.** A severe earthquake damaged the Pusa building, so the institute moved to Delhi. ↑ 3
4. **True.** Stem, leaf and stripe rusts were all resisted by NP809. ↑ 4
5. **False.** NP809 is known for rust resistance. The sources do not call it a dwarf or Mexican wheat. ↑ 5
6. **True.** That is the quote Pachauri reports in 2006. ↑ 6
7. **True.** He founded it and edited its journal for 25 years. ↑ 7
8. **True.** The official year-wise list places him in the 1958 Padma Shri list. ↑ 8
9. **Think it through.** It gave Pal the science of plant genetics. He later used it to breed wheat that resisted disease. ↑ 9
10. **Think it through.** IARI is one research institute. ICAR is the national council for agricultural research. ↑ 10
11. **Think it through.** Resisting one rust leaves the crop open to the other two. NP809 resisted all three. ↑ 11
12. **Think it through.** A big change has many builders. Read each question’s wording and pick the name it asks for. ↑ 12
13. **Think it through.** Padma Vibhushan is the highest, then Padma Bhushan, then Padma Shri. ↑ 13

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