

## Herbicide resistance management and tillage reforms in the rice–wheat cropping systems of South Asia

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**Summary** The shift in weed flora in favour of wild canary grass (*Phalaris minor* Retz) from among wide spectrum weed flora in 1970s and towards resistant populations within *P. minor* during 1990s is the classical example of weed shifts happened in wheat in North-West India. Herbicide resistance crisis during 1994–2003 which resulted in significant yield losses in wheat in NW India demanded development of long-term sustainable solutions. To develop integrated solution, a paradigm shift is needed in the ways we innovate, develop, test, and disseminate technologies. Zero tillage (ZT) research which was at the dead end in 1996 was taken up using farmer’s participatory approach in a project funded by Australian Centre for International Agricultural Research (ACIAR) and supported by International Maize and Wheat Improvement Center (CIMMYT). By 2002 more than 0.3 M ha

were brought under ZT. Long-term studies indicate that early wheat planting combined with ZT+ residue as much can overcome the problem of herbicide resistant *P. minor* and herbicides can be skipped once in 3–4 years. These past projects and current one ‘Cereal Systems Initiative in South Asia (CSISA)’ conveyed a powerful message in this regard. The work explains how crisis like herbicide resistance led to opportunities that are being extended to whole Indo-Gangetic Plains. The sustainable intensification with tillage reforms and better bet agronomy need to be aligned with research, teaching and extension system in national system. While implementing various projects (CIMMYT, ACIAR, National Agricultural Technology Project and CSISA), we saw an opportunity to design a more practical and pragmatic template for development and dissemination of technologies at the same time.