Food security will be increasingly challenged by climate change, natural resource degradation, and population growth. Wheat yields, in particular, have already stagnated in many regions and will be further affected by warming temperatures. Despite these challenges, wheat yields can be increased by improving management practices in regions with existing yield gaps. We present two studies that use satellite data to identify the factors most associated with yield gaps and potential interventions to sustainably increase yields in India’s main wheat belt, the Indo-Gangetic Plains. Using satellite-derived estimates of yield and sow dates along with village-level census and weather data, we find that late sow dates and warmer temperatures are the factors that most explain wheat yield gaps across the IGP. This suggests that strategies to reduce the negative effects of heat stress, like earlier sowing and planting heat-tolerant wheat varieties, are critical for increasing wheat yields in this globally-important agricultural region. We also use high-resolution micro-satellite data (< 5 m) to map field and sub-field level yields across villages in Bihar in the eastern IGP. Using these data, we show that a new fertilizer spreader technology increases yields by approximately 8% without increasing inputs, and satellite data can be used to appropriately target this intervention. By identifying sustainable strategies to close existing yield gaps, this work discusses ways to achieve the sustainable development goal of zero hunger.