Some considerations on rice productivity in the Tamghat Valley - Nepal

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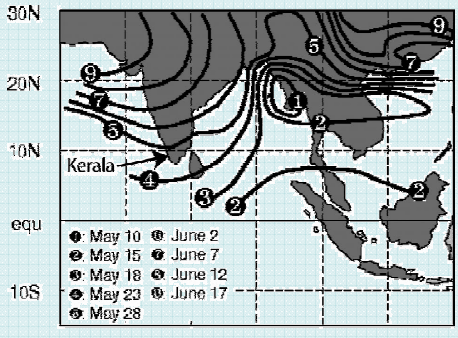


Summer monsoon season onset (Fasullo & Webster 2003).

The monsoon climates of Asia are ruled by the onset, between May and June (see picture on the left), of the summer monsoon, a complex circulation pattern that involves the whole troposphere, giving rise to the dominance of peculiar weather conditions characterized by deep convection, persisting rainfall and strong cloud coverage, with relevant effects on air temperature and global solar radiation.
This state persists until october when the onset of a transitional regime towards winter monsoon conditions is usually observed. The monsoon strength is influenced by other periodic phenomena of tropical atmosphere and, in particular, it is well known the depleting effect of ENSO (El Nino Southern Oscillation).

Monsoon season thunderstorms near Jamalpur, northern Bangladesh, 90.5°E, 25.0°N, 31 August 1985 (NASA image STS51F-31-069).

Rice (Horiza stativa L.) is the main cereal for human nutrition in the sud-east Asia area where it is the most strategic crop for food security.
Relevant opportunities for the enhancement of rice productivity are founded on the improvement of varieties and agro-techniques.
Crop modeling can be an aid to this approach showing the enhancement in crop production that can be attained with improved varieties and eliminating the limitations to rice productivity (nutrients, weeds, pests and diseases).
We aims to testify the effects of enhanced cultivation techniques on the paddy rice productivity of the Tamghat Valley, crossed by the Jhiku Khola river and located in the Kavrepalanchok district, 40 Km from Kathmandu, on the central hills of Nepal. Nepal agriculture employs 65% of the population and achieves the 39% of GDP. Rice production is around 2.78 t ha-1, a very low value if compared with the one that the state of art varieties and techniques may allow (IRRI, 2008 World Rice Statistics).

The Tamghat Valley is characterised by a monsoon-type climate, which gives a seasonal mark to the yearly rainfall regime. An increase of the rainfall during April and May preludes to summer monsoon which reaches his peak during the months of July and August. The culture of rice in the Tamghat Valley is practiced for subsistence, while the one of vegetables, in part, is instead made for business.

The main limitations to rice productivity are the little or null use of chemical fertilizers (often replaced by manures or compost), the obsolete varietal park, with varieties not able to exploit an intensive fertilization, obsolete agro-techniques, little attention to pest problems (weeds, fungal diseases, insects) and bad practice of transplant techniques, operated on 30-45 days old plants (Uprety, 2004).

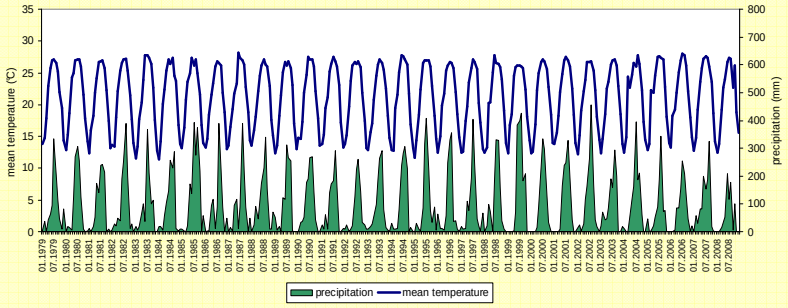
The dynamic simulation model adopted (Mariani, 2002) considers only thermal limitation neglecting other limitations (by water, nutrients, pests and diseases). The model is founded on a cascade of matter triggered by solar radiation absorbed by rice canopy (APAR).

The model is driven by a monthly dataset (maximum and minimum temperatures, rainfall). from the Hydrometeorological Service Station located in Panchkhal (Kavrepalanchock district).

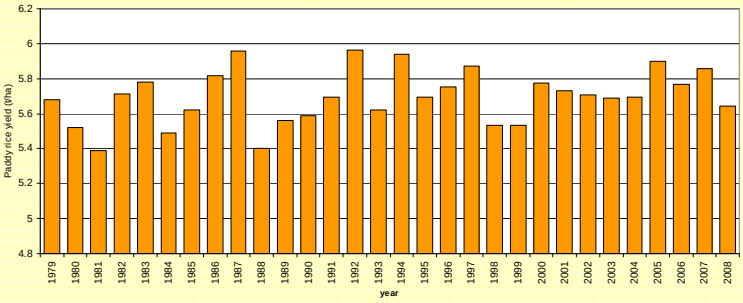
Results show that, since the late 90's to 2008, the inter annual variability of the rice production amounted to a very small value compared to what occurred before. The stability is determined mainly by a relative absence of meteorological trends in temperature.
In contrast, the values recorded during the 80's indicate a greater variability in crop production.
The annual mean productivity data (diagram on the right), calculated for the period 1979-2008, are same as 5.7 t ha^{-1}, with a standard deviation of 0.15 t ha^{-1}.
The production related to cultivations in dry technique (fed only by rain) drops to 5.5 t ha-1, with standard deviation of 0.50 t ha^{-1}.

Nepal, Kavrepalanchok district.

DAMBAR K SHRESTHA Nepal Times, 7 August 2009 - Delayed Monsoon , postponed rice planting and flooding.



Monthly temperature and precipitation at Panchkhal (1979 – 2008). The stability of temperatures can be noted. Rainfall shows differences on the monsoon onset date.



Paddy rice yield - t/ha (1979 – 2008). Low productivity can be noted in 1981 and 1988, because of onset monsoon delay.