

Precise knowledge of the yields in peasant farming and an understanding of how these relate to environmental conditions, techniques used and household economics are needed to direct research and extension. Pierre Morlon reveals how highland peasants' ways of dealing with climatic risks and market conditions lead to a huge variation in yields.



Peasant strategies to deal with risk

Pierre Morlon

In the Andes of Peru and Bolivia, observations and measurements in the field reveal that yields are sometimes far higher than given in official statistics or obtained by quick surveys (Hibon 1981, Horton 1984, Morlon 1990). Above all, they show the extreme variability in the yields of all crops, firstly, between years; secondly, between different categories of producers and even between producers within each category; and thirdly, between the different plots cultivated by one and the same family in different "production zones" (Mayer 1985). Some plots are cultivated "intensively" with chemical fertilizers, pesticides and modern plant varieties, and others "in the traditional way" without purchased inputs.

Therefore, when very low yields are observed, they must not be taken at face value and in isolation (leading to the all too frequently drawn wrong conclusions), but as the lower end of a vast range of variations.

Accurate assessment of yields raises several methodological or conceptual questions (Morlon 1990):

- survey versus direct measurement in the field;
- sampling versus exhaustive verification of all fields;
- evaluation of the associated crops;
- the "byproducts" to be used for animal feed may be just as important to the peasant as the "product" which alone interests the technician;
- choice of the productivity criterion in the light of the factor perceived as a

constraint: return per unit area, labour productivity, return compared to the amount of seed used, irrigation water efficiency, etc.

However, it is not enough to know the yields, they must also be explained.

Commercialisation as limiting factor

It has often been observed that peasants voluntarily limit production for market, either because of the low prices received from greedy middlemen or because there is an apparent lack of outlets, given that big business and the food processing industries prefer to buy uniform cargos of imported (often subsidised) foodstuffs, rather than collect many assorted (and never subsidised) batches produced by smallholders. The emphasis on farm consumption therefore emerges not as a hangover from the past, but as a response to current conditions

In addition to the natural risks of bad harvests, marketing problems induce the peasants to buy the lowest possible quantity of inputs or services, the cost of which they cannot be sure of recovering by selling the increased production which might result. This is the case when the crops are for farm consumption, when the ratio between market prices and production costs are unfavourable, and in the production zones at highest ecological risk. On the other hand, peasants at the very bottom of the economic scale and in the most precarious circumstances have been seen to

The soil cultivation achieved with the 'chaquitacla' (andean footplough) permits control of water runoff. Huancho (Puno), Peru, 3850 meters above sea level. Photo: Pierre Morlon.

adopt unhesitatingly new, more productive techniques when these are adapted to their situation and are deemed more reliable – in their particular context – than the other economic activities of the family. This explains why, in certain production zones, the same peasants apply traditional practices without purchased inputs and, in other zones, turn to "modern" techniques with high inputs.

Competing factors in peasant economy

Within the peasant family economy, there are several competing factors. Returns per unit area depend on the choice of priorities made by the family between agricultural and non-agricultural activities.

For example, agronomic recommendations and input supply were part of a 1978-79 study of several peasant families in the Altiplano (Montoya et al 1986). Two families seemed very similar with respect to size, economic level and land ownership (just over 0.5 ha). Yet, in the fields of the first family, potato yields that year were between 15 and 40 t/ha, whereas the second family harvested an average of 5.5 t/ha, with a maximum of 9 t/ha. The difference could

not be explained by natural environmental factors. However, it turned out that the head of the first family had decided not to migrate temporarily that year, in order to watch over the crops and ensure the harvest. In contrast, the other family had concentrated on artisanal activities and had not carried out (or did so too late) certain cultural operations such as weeding. The difference in priorities was perhaps due to the difference in the ownership of livestock which guarantees cash income.

Multiplying the combinations

Brunschwig (1986: pers.comm.) calculated that, in the Laraos community on irrigated terraces at an altitude of 3200-3400 m, the average maize yield of the 5 families studied was 5100 kg/ha during a favourable year, using traditional varieties and no purchased chemical inputs. This was the average of all fields of the five families studied. In fact, the average return includes and masks extremes ranging from 1600 to 12,000 kg/ha (Fig. 1).

A yield of 12 t/ha of maize is probably exceptional, but we are interested in precisely such exceptions because they illustrate the high potential of a highly developed production zone and give a quite surprising answer to the question: What yields can be obtained from traditional farming? This question must be replaced by another: Why are these high yields not obtained everywhere?

Risks, especially climatic ones, inevitably cause marked variations between years and, in the same year, between fields exposed to these risks to a greater or lesser extent. Faced with these risks, the peasants have long adopted two main complementary strategies:

1) Reducing the risk level

- by developing the environment: irrigation, terraces, ridged fields, (although this does not completely suppress variability, cf Fig. 1);
- by choosing ways of tilling and working the soil that retain the water, or remove it, depending on the type of soil, land relief, and precipitation in that year (Bourliaud et al 1988);
- by adapting the morphology of the canopy to prevailing microclimatic characteristics (high-altitude frosts in particular).

2) Spreading the risks as much as possible

- in time, by staggering sowing dates; dehydrating tubers so that the results of good years can be carried over to bad ones;
- in space, by exploiting the maximum number of ecological zones on the mountain (Murra 1975) and by cropping a large number of dispersed ("salpicadas") plots (Morlon et al 1982).

The result of this risk-spreading strategy is the multiplication of the number of farming combinations: cultivated sites (soil, climate, topography) multiplied by ways of working the soil, multiplied by species and varieties, multiplied by sowing dates etc, so that at least some of these combinations will be productive.

Thus, the divergent yields (their dispersal in statistical terms) of the various fields cultivated by the same family result from the peasant strategy of risk spreading and from complementary use of different ecological environments. As the climate is unpredictable, the peasant cannot foresee which of the combinations will prove best (except in very favourable zones such as the "campiñas", irrigated fields with hedges and groves in valley bottoms at about 3000 m) and, in fact, in any one year only a small proportion of these combinations prove to be "optimal" and produce high yields. Return from the other cultivated plots can be very low, and therefore the average yield, too.

Averages are of no use

Thus, if we merely look at average data, official statistics are not necessarily far from reality, but knowing only averages is of no use for improving production and the lot of the peasant farmer. To begin to work efficiently, the production obtained from many fields must first be measured. Next, one must analyse the factors which intervened in each case and the causes of the differences observed - not forgetting that, while the yields obtained affect the producers' standard of living, the organisation of the economic system of the peasant family is one of the principal determinants of these yields. ■

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Pierre Morlon

INRA

26, bd du Docteur Petitjean
21100 Dijon, France

Yield variations from different irrigated maize fields of 5 peasant farmers, Laraos, in the same year. (Brunschwig, personal communication).

