What is the multifunctionality of the mango orchards in Senegal?

AGRO 2015 MONTPELLIER 07 -10 SEPTEMBER

Paterne Diatta[1], Hubert de Bon[3], Lamine Diame [1,2], Cheikh Amet Bassirou Sané[1,2], Jean-Yves Rey [1,3], Karamoko Diarra[2], Isabelle Grechi[4]

[1] Centre de Développement Horticole, ISRA, Dakar, Sénégal
[2] Faculté des Sciences et Technologies, Université Cheikh Anta Diop, Dakar, Sénégal
[3] UPR HortSys, CIRAD, Montpellier, France
[4] UPR HortSys, CIRAD, La Réunion, France

Contact: hubert.de_bon@cirad.fr

A previous typology has classified the mango orchards in four types: (1) No-input mango diversified orchards; (2) Low-input mango orchards; (3) Medium-input citrus predominant orchards; (4) Medium-input large mango or citrus predominant orchards (Grechi et al. 2013). The functions are defined with respect to user expectations (farmers, breeders, walkers, inhabitants, local representatives, territory administrator). The objective is to compare the functions of the four types of orchards.

Carrot and onion in type 2 mango orchard of local variety Dieg Bougatt. © Paterne Diatta

Materials and Methods

- A list of functions has been established following three categories. Thirteeen (13) indicators were selected among the variables of the work of Grechi et al. (2013).
- The indicator individual values are transformed by arithmetic operations and then added together to give "synthetic indicators" of comparable size.

Table I. The functions and the 13 selected indicators of the Niayes area orchards.

Categries of functions	Description of the functions	Selected indicators	Opération (i)
Productive functions	– creating income	– pasture	i*3,5
	– maintaining employment in the area	– other crop	i*5
	– land markers	– hedge	i/20
	– increasing assets	– concrete block wall	i*2
	– others economic activities		
Social functions	– wooded savannah landscape	– ratio "hedges/acreage"	i/20
	– tourism	– ratio "hedges/acreage"	i/20
	– maintaining employment on farm	– acreage	i/20
	– use of local variety	– percentage of local mango varieties	i/20
Environmental functions	– storage of carbon	– fertilization	i
	– plant biodiversity and fauna cultivated biodiversity	– number of hedges species	i/2
		– fruit trees species	i/2
	– pesticides pollution of water and soil	– pesticides use	i/2
	– water depletion	– irrigation	1/i
	– creation of humid zones	– cover of the soil by the canopy	i/20

Defensive hedge around a mango orchard. © Hubert de Bon

Rejuvenation wood in mango orchard type 4. © Paterne Diatta

Results - Discussion

- The synthetic indicators of the productive, social and agro-environmental functions are gathered for the four types of orchards in the table II.
- The table II puts in evidence that the functions of the different types of orchards seem intuitively in accordance with the expected results for social and agro-environmental functions, although a low number of indicators are used compared to the 42 indicators of the IDEA method (Villain et al. 2008). Agro-environmental functions are lower in the large orchards mainly focused on export production. The type (3) orchard provides more productive and social functions that the types (1), (2) and (4).

Table II. Synthetic indicators of functions for the 4 types of orchards in Niayes area (Senegal).

Functions	Productive	Social	Agro-environmental
(1) No-input mango diversified orchards	9.4	6.1	15.1
(2) Low-input mango orchards	11.0	5.9	13.0
(3) Medium-input citrus-predominant orchards	13.0	7.8	12.1
(4) Medium-input large mango or citrus predominant orchards	10.2	5.3	8.4

Mango orchard (type 4) in Keur Sega for the export market. © Hubert de Bon

Strawberry and lettuce in citrus orchard type 3. © Paterne Diatta

Conclusions

It seems possible to re-analyze an agronomic survey in a multifunctional approach which allows to better characterize the assets of orchards in a rural area.

References

Grechi, I., Sane, C.A.B., Diame, L., de Bon, H., Benneveau, A., Michels, T., Huguenin, V., Malézieux, E., Diarra, K., Rey, J.Y. (2013). Mango-based orchards in Senegal: diversity of design and management patterns. Fruits, 68, 447-466.

Villain, L., Boisset, K., Girardin, P., Guillaumin, A., Mouchet, C., Viaux, P., Zahm, F. (2008). La méthode IDEA. Indicateurs de durabilité des exploitations agricoles. Guide d'utilisation 3e édition, Educagri, Dijon.

Design: CIRAD, Martine Dupontel, August 2015

Acknowledgements.
We sincerely thank all the farmers who have answer patiently to all our questions.

ISRA · cirad AGRICULTURAL RESEARCH FOR DEVELOPMENT