

Is conventional small-scale cotton-based agriculture sustainable in West and Central Africa?

Balarabé O.¹, Séguy L.², Naudin K.³, Lifran R.⁴



Regional workshop on CA
Xieng Khouang Laos



Northern Cameroon: A context with constraints...

Climatic and soil fertility constraints

A high demographic pressure with effect on soil utilization .

Population movement from high to low density population regions, with same extensive agricultural practices

A heterogenous milieu with real need for appropriate adaptation of technical solutions

Small-scaled farm unit with little adaptation margin(2,6 ha average total area), with little agricultural equipment

Differentiated farmers and livestock owners communities, with a high pressure on crop residues and generated conflicts

A strong cotton based cropping systems with cotton depending input supply and extension.

A fluctuating cotton price on the international market

An increasing input price figure, especially fertilisers



What is Sustainable Agriculture ?

Sustainable agriculture addresses the issue of ensuring sustainable satisfaction of food and other services (monetary revenue) with respect to the three main components of sustainable development (Guyomard 2004), (FAO 1999):

economic sustainability also called economic efficiency, dealing with the ability of the farming system to ensure sufficient and competitive output production to fulfil market and population needs;

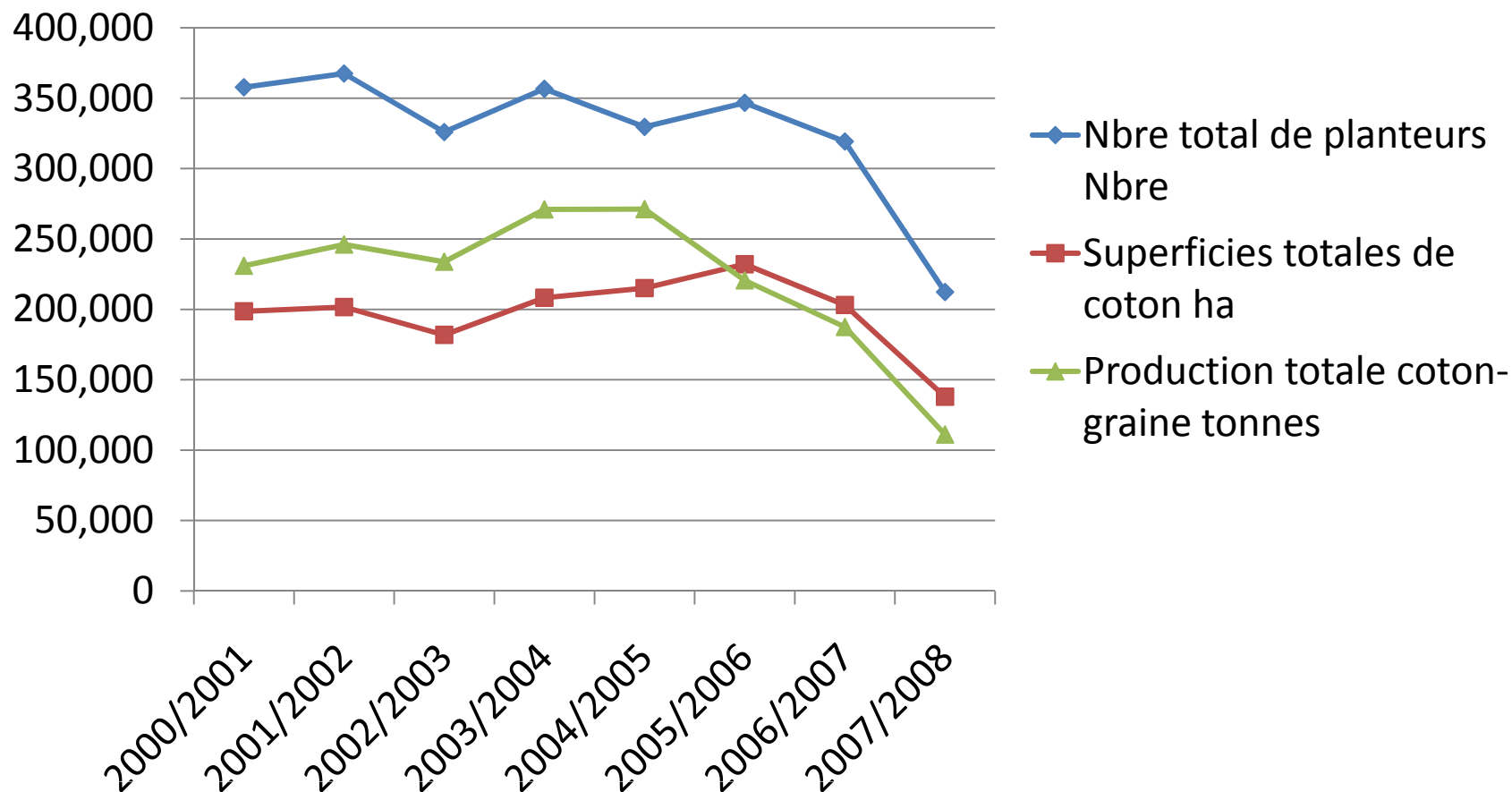
social sustainability or social equity, dealing with agricultural ability to ensure equitable revenue or return to different stakeholders of the agricultural production chain ;

Ecological sustainability, dealing with intergenerational preservation of the environment referring here to the sum of natural resources used to ensure agricultural production.

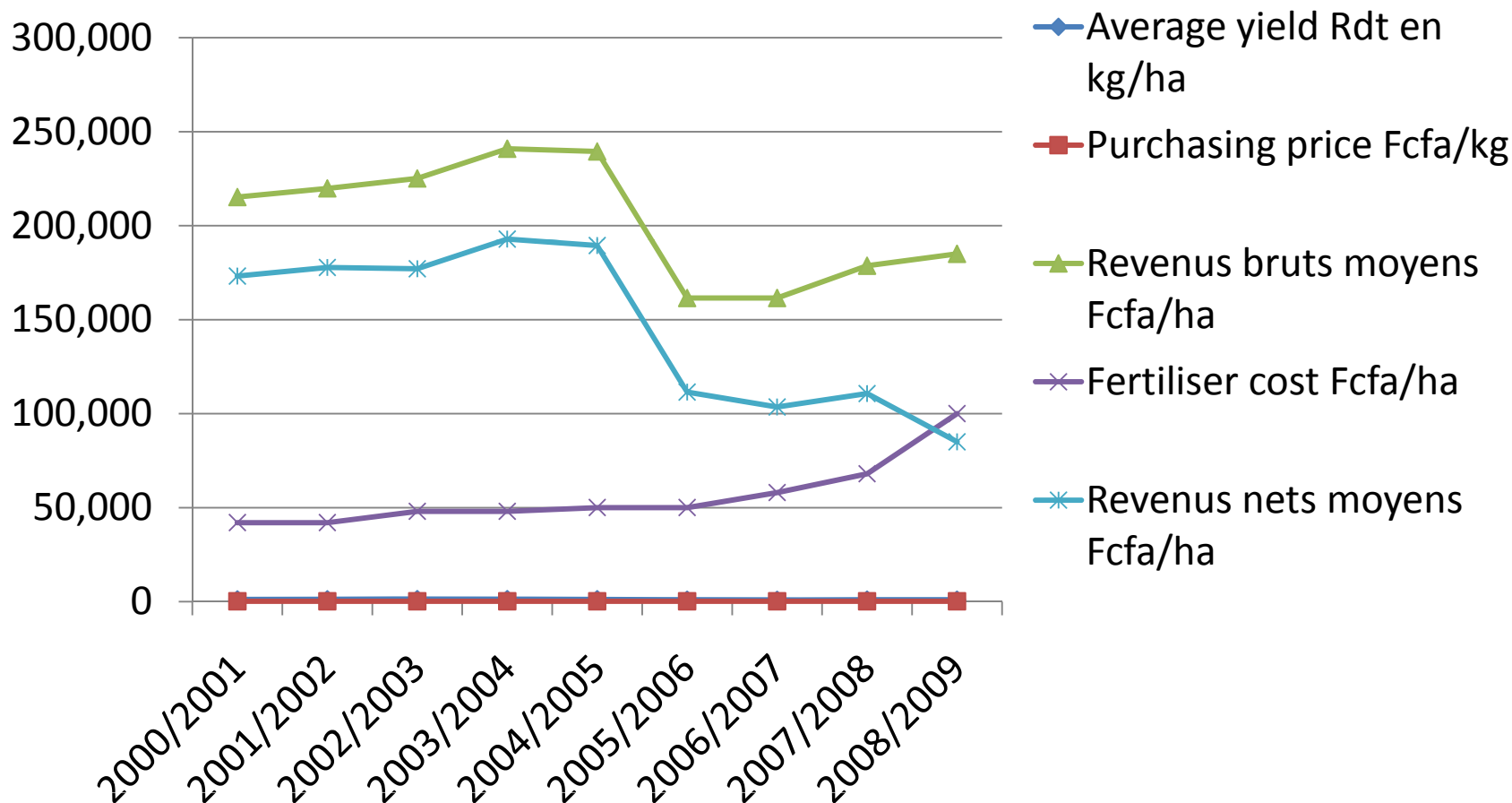


Economic sustainability

Total production, Total area cultivated and number of farmers of cotton 2000-2008



Average Yield, fertilizer cost, Purchasing price and farmer revenue from cotton. 2000-2008



Social sustainability

Social equity ...

1. Even though reinforced through equalizing prices in input supply and purchasing prices of cotton seeds all over the cotton belt
2. Limited by effect of ecological differences on agricultural performances
2. Limited by effects of input availability to farmer
2. Limited by traditional organic matter management among community stakeholders



Ecological sustainability

Soil fertility degradation due to...

Erosion due to inappropriate soil management practises



Unappropriated management of soil organic matter and soil nutrients balance



Opportunities with DMC

Increasing economic efficiency...

With increasing average yields

Decreasing fertiliser application need over time

Decreasing labour constraint especially weeding constraints

Enhancing agro-climatic conditions for diversification





... Reducing social differences in agricultural returns

1. Enhancing yield in low fertility soils with minimum fertiliser application

Increasing yield over time with minimum fertiliser application 50 % of fertiliser recommended level

Decreasing yield differences between high and low fertiliser plots

2. Decreasing climatic constraints effects on agricultural yields

Climatic stabilised yields over time

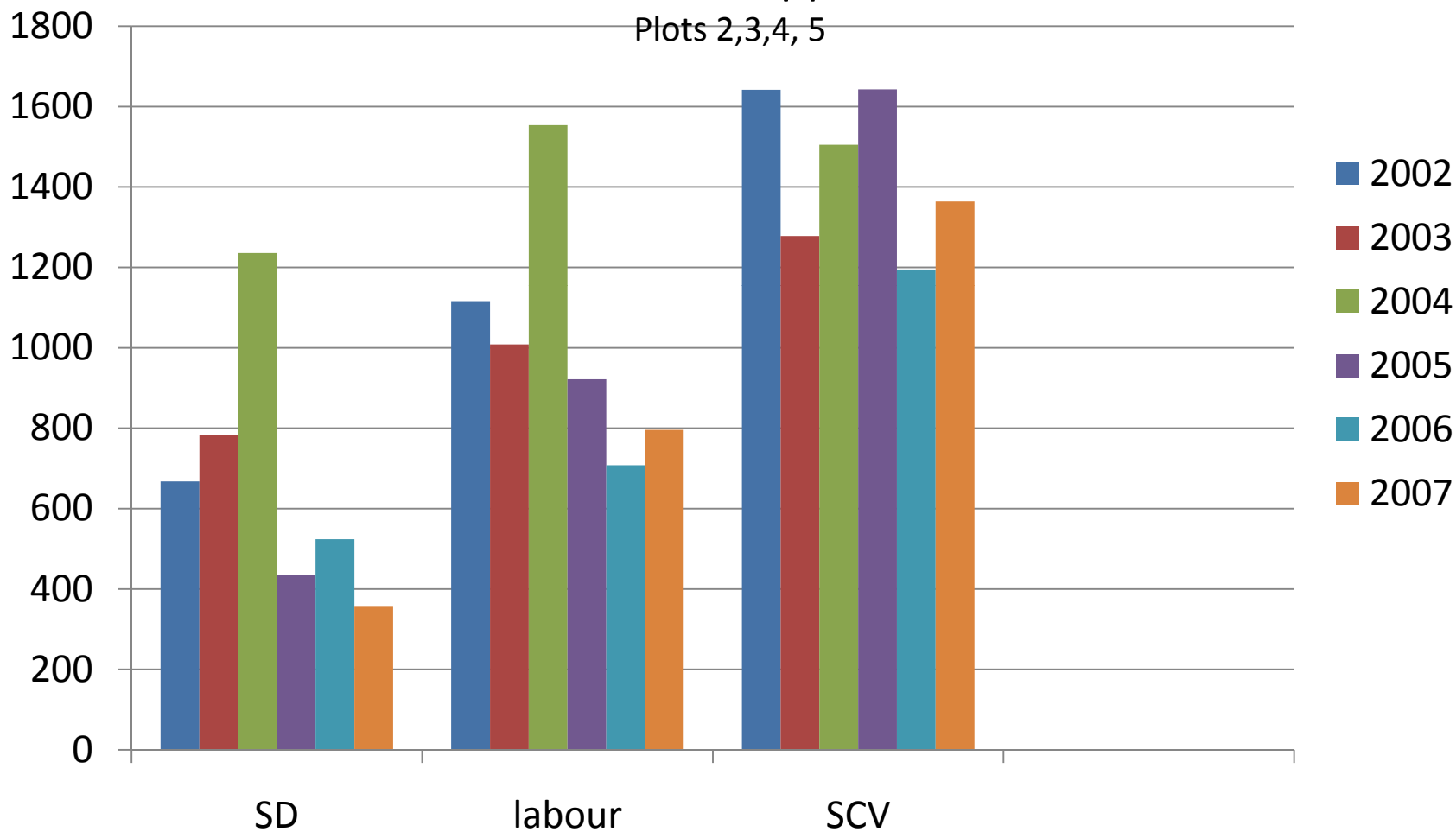
3. Introducing crop residues management issues between farmers and livestock owners



Average yield evolution in cotton on station results, Zouana (750 mm rainfall average)

2002-2007

Low fertiliser application



... enhancing ecological sustainability by:

1. Reducing soil erosion

Protecting soil against splash-effect...

and hence increasing its productivity

2. Increasing soil organic matter content

3. Increasing global ecological diversity in cropping systems → macrofauna and plant diversity and complementarities



Conclusion and perspectives

Small-scaled, cotton based agriculture, progressively fails to fulfill sustainable development, mainly due to economic and technical constraints

DMC appears to be more suitable to fulfil the three main components of sustainable development in relation with agriculture

Shifting from conventional agriculture is necessary and must be accompanied by both scientific and institutional community

Especially within small-scale agriculture with little alternatives



Merci pour votre attention