

# Improved Seed for West African Cocoa Farmers

The foundation of a sustainable cocoa economy

by

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# Benefit of Improved Cocoa Varieties

The traditional “West African Amelonado” variety would be prohibitively difficult to establish in the soil and climatic conditions of today’s West Africa

The gain in yield on farm of modern varieties over first generation “hybrids” was estimated at about 40%





# How Do We Produce Cocoa Seeds?

- The best known seedling varieties are crosses between two carefully selected individual trees. They are popularly known as “hybrids”
- The two parental trees can be multiplied vegetatively, normally by budding in West Africa, so they become two clones, that are planted in large numbers in “seed gardens”
- The “hybrid” is produced in bulk by crossing one of the clones with the other

# Modern Seed Gardens: Manual Pollination

At CRIG in Ghana, Don Edwards showed that intensive mass manual pollination of freshly opened flowers gives >95% seed purity when properly managed. To transfer pollen, an anther from the “male” parent is dabbed onto the stigma of a freshly opened flower of the “female” one





# Can We Produce Seed at Acceptable Cost?

In Ghana, a skilled pollinator does 400+ pollinations/day with 60+% recovery as ripe pods, providing 8,400 or more seeds

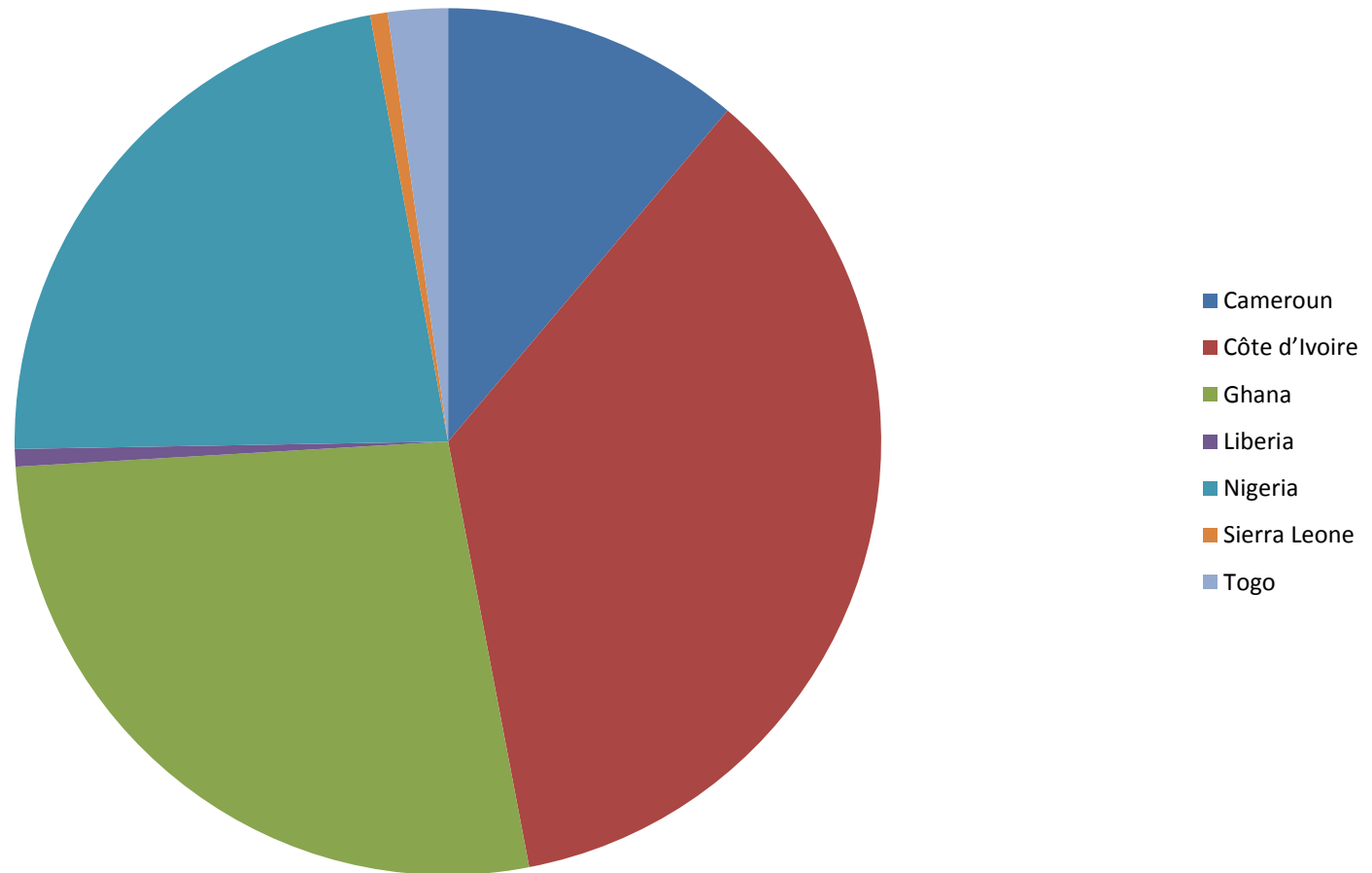








# FAO Estimated Cocoa Area in West Africa (2010, total 6,001,000ha)



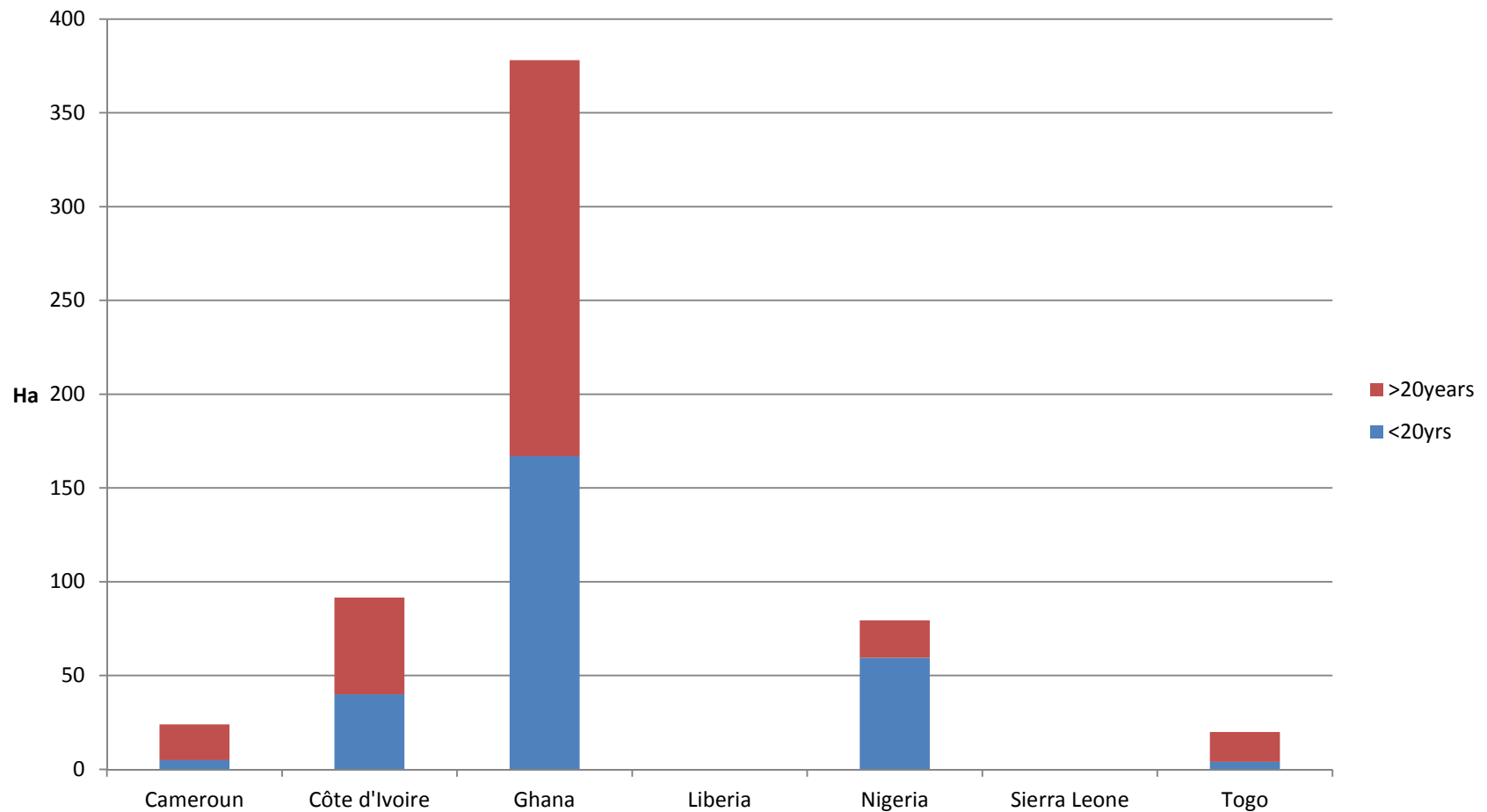


# Estimated Proportions of Farmers Utilising Improved Seed

- Cameroon <10%
- Côte d'Ivoire ~5%
- Ghana ~50%
- Liberia nil, except in aid programmes
- Nigeria ~5%
- Sierra Leone nil
- Togo ~10%

STCP's and Author's estimates

# Approximate Ages and Usable Areas (ha) of Cocoa Seed Gardens





# Assumptions behind the Estimation of the Required Seed Garden Capacity

- Reduce cocoa area in Côte d'Ivoire and Ghana, Ghana by 25%, no change in Togo, increase by 50% in Nigeria and double in Liberia and Sierra Leone. Retain current direct sowing/nursery ratio
- Replant cocoa every 30 years
- Seed gardens will be 85% pod-bearing “females” and 15% pollen-providing “males” with seed pods produced by mass manual pollination of freshly opened flowers

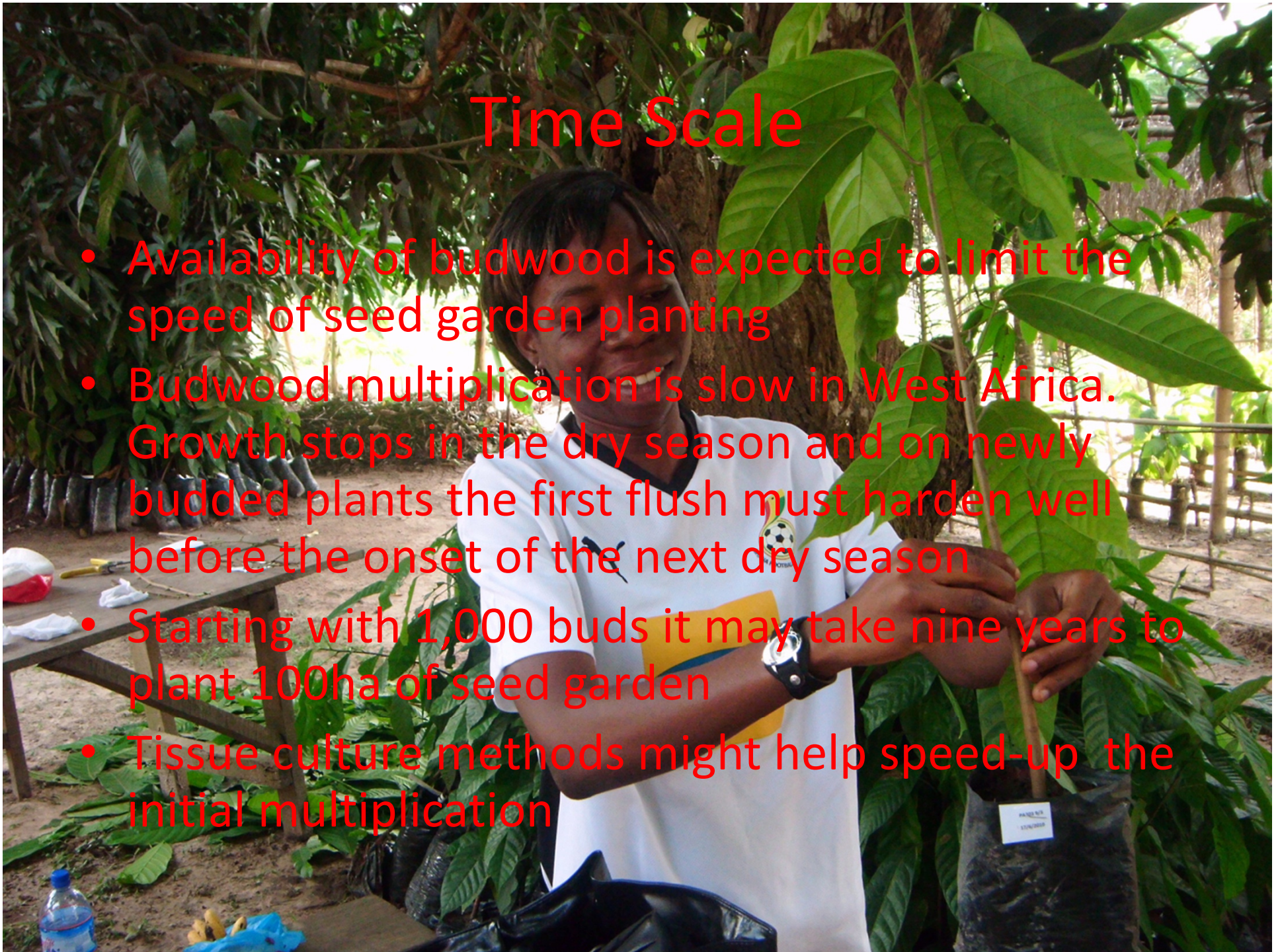
# Seed Garden Capacity – Reality Check

- The existing capacity is roughly the theoretical requirement in Ghana
- In Ghana it is said that the seed gardens meet about 50% of farmers' planting requirement
- It is suggested that seed garden capacity should be double the theoretical estimate in the larger producing countries, and perhaps two and a half times in Nigeria, given the physical size of the country

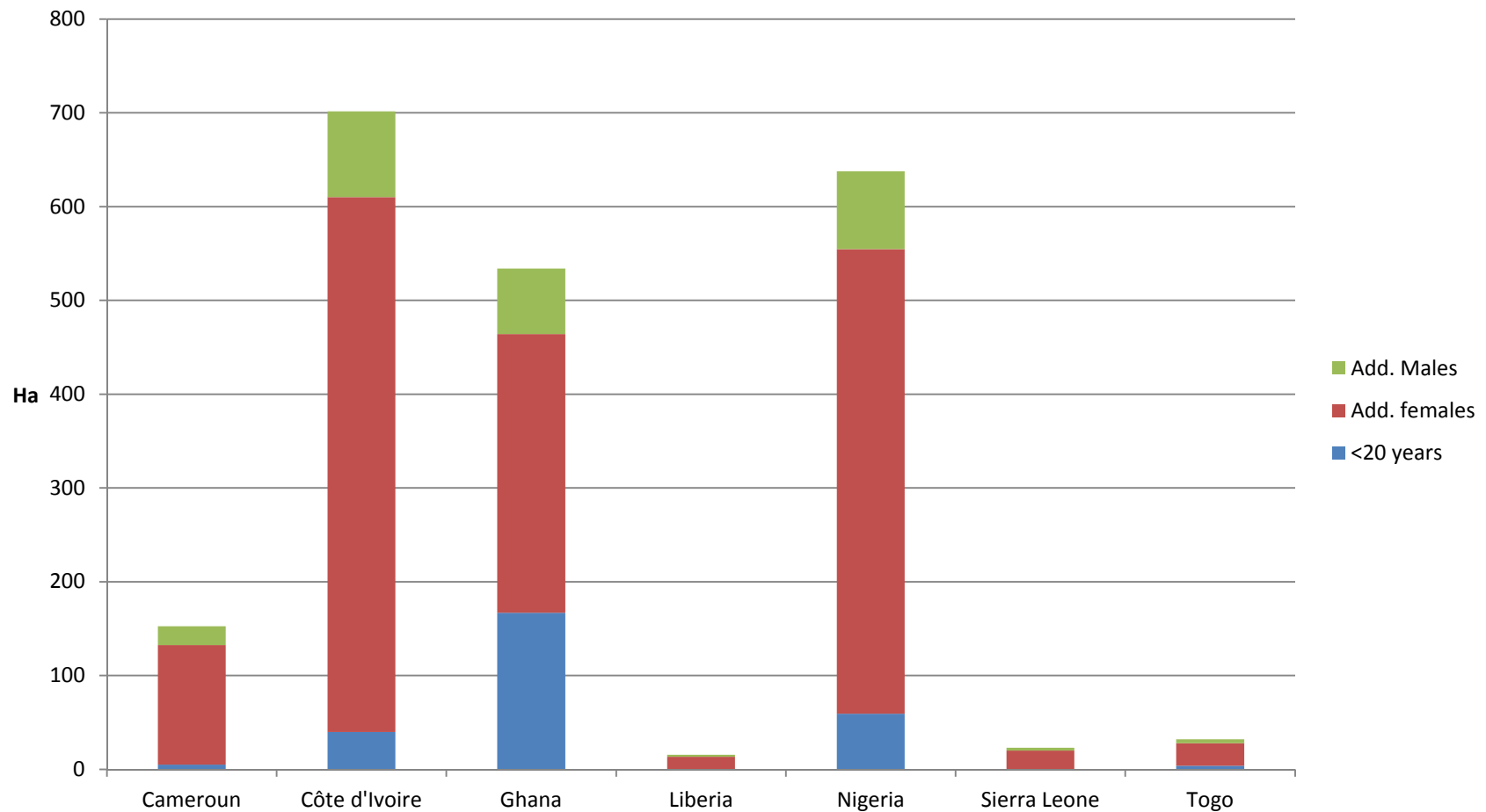


# Time Scale

- Availability of budwood is expected to limit the speed of seed garden planting
- Budwood multiplication is slow in West Africa. Growth stops in the dry season and on newly budded plants the first flush must harden well before the onset of the next dry season
- Starting with 1,000 buds it may take nine years to plant 100ha of seed garden
- Tissue culture methods might help speed-up the initial multiplication

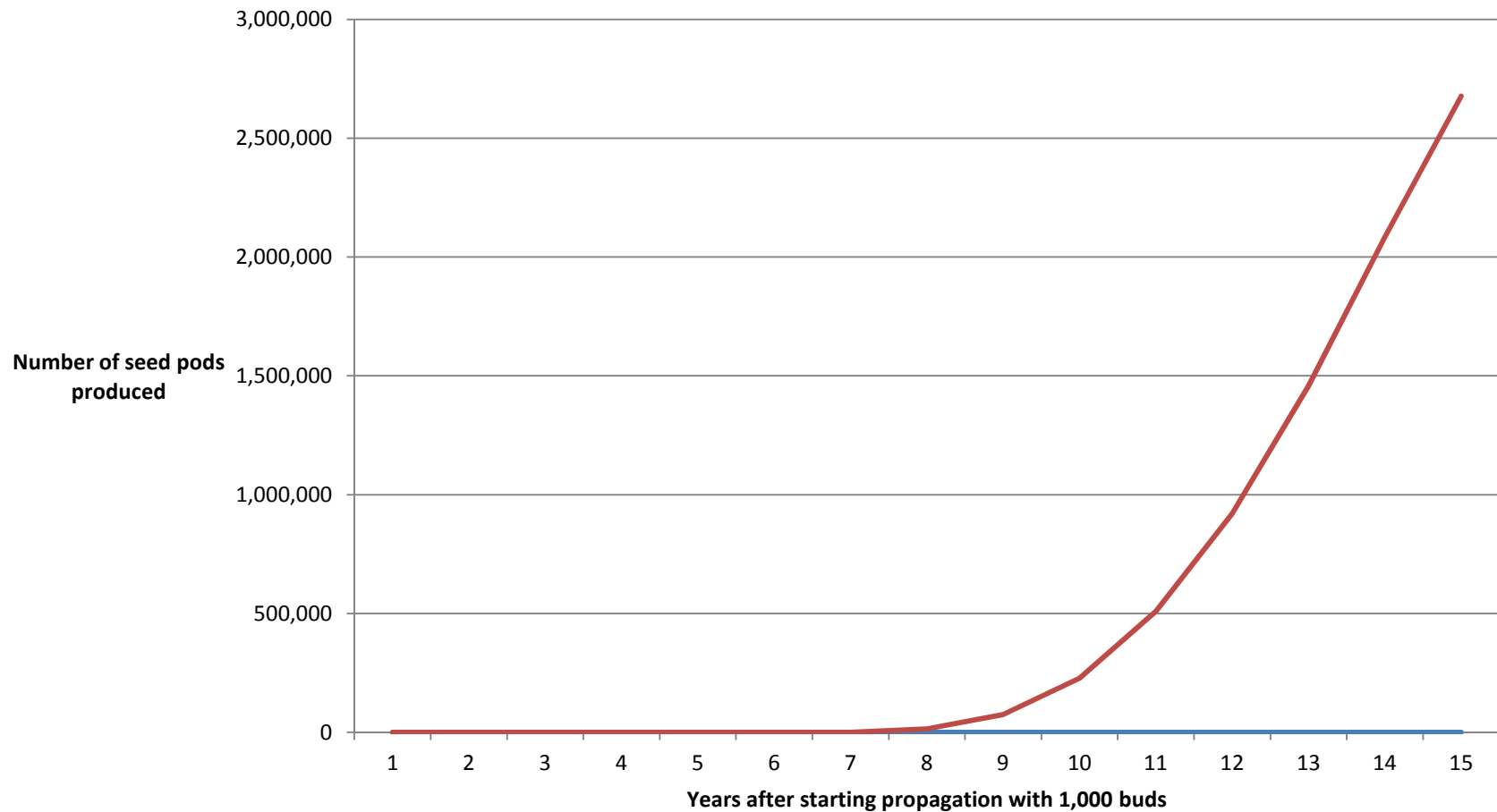


# Current 20 Year Old and less and Proposed Seed Garden Areas (ha)





# Build-up of Seed Pod Production



# Efficiency of Seed Utilisation

- An analysis is required of farmers' expected seed requirements and planting practices
- Confirmation and scaling up of a Brazilian finding that seeds can be stored at ambient temperature for six months in methyl cellulose gel could greatly improve seed distribution and utilisation
- Irrigation of seed gardens is worth investigating as it may facilitate seed production at the time of the year when seeds are most needed by farmers



# Breeding Programmes

Delivering improved varieties to farmers is under-emphasised given its proven impact on sustainable cocoa production. Why?

- variety development isn't always integrated with the means to delivery the varieties to the farmers quickly
- large resources are used over long periods of time for essential but unglamorous work
- long-term co-operation with other disciplines is needed, for example virologists

# Do We Know what Varieties to Produce?

- The best information is in Côte d'Ivoire and Ghana, some in Nigeria and Cameroun, less in Togo and none in Liberia and Sierra Leone
- There is partial evidence that across West Africa, the main effects of Genotype and of Environment are larger than their interaction, but more work is required.....
- Any new variety must meet the consuming industry's requirements for quality





# Integrated Programme

The proposed seed garden development programme must be integrated with identification of the hybrids to be produced

Now that CSSV has been found from the W of Côte d'Ivoire to the E of Nigeria, there is a strong argument for incorporating in new varieties the already proven resistance to virus spread



# What Will the Proposed Programme Cost?

Seed garden development and associated breeding including selection for CSSV resistance is predicted to cost \$61m over 12 years

What would a business as usual strategy cost?

Already we are too late for new investment in seed gardens to contribute to the production of an additional 1m t of cocoa beans in 2020





# Next Steps

The proposed programme requires:

- further investigation of interest and refinement of the proposed activities and preliminary cost estimates, and the structure
- detailed feasibility study
- one or more major donors
- proven professional management

