

Towards an integrated approach for tsetse flies and *trypanosomiasis* control in Africa.

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Summary

Due to expanding human population in Africa, interventions towards tsetse flies have to be carefully considered. A future approach should be based on the following points:

- a better understanding of agrosystems to define adequate and sustainable *trypanosomiasis* control strategies.
- integration of these interventions in agricultural development programme.
- participation of rural communities in tsetse control operations.

Résumé

Suite à la croissance démographique enregistrée en Afrique, les opérations de contrôle de la tsé-tsé doivent être soigneusement programmées. L'approche pour les prochaines campagnes doit être basée sur les points suivants:

- une meilleure connaissance des systèmes agro-pastoraux afin d'identifier des techniques de lutte adaptées et viables.
- l'intégration de ces opérations dans les programmes de développement agricole.
- la participation et la prise en main par les communautés rurales du contrôle de la tsé-tsé.

Introduction

Historically the threat of *trypanosomiasis* on the agricultural practices of human populations was minimal as adequate productive and uninfested areas were available to meet the needs. As human and livestock populations began to increase and the demand for more land developed continued avoidance of tsetse infested areas was facilitated by the effects of the major rinderpest epidemic which swept through Africa in the late 1800's, decimating wildlife hosts and severely retracting tsetse density and distribution. In some parts of Africa, it is believed that even now *Glossina* spp. are still actively re-colonising this lost territory rather than advancing into new areas (4).

In the past, due to the reliance on insecticidal techniques for the control of tsetse, the direct effect of these interventions were of primary ecological and environmental consideration. Whilst the secondary or indirect effects, consequent upon alleviation or removal of the constraint, due to land use and settlement, were considered to be of much less importance. In recent years several major developments in this field have drastically reversed this trend placing priority consideration on the establishment of good land practice and resource consideration.

Intensive monitoring by independent scientific environmental groups have recorded that the direct effects of selective ground spraying of chlorinated hydrocarbons and sequential aerial application of low volume non-residual endosulphan

and certain synthetic pyrethroids are of acceptable levels and do not incur major irreversible effects on non-target species.

The development and increasing use of vector control systems which rely on maximising the attraction of visual baits to kill or capture tsetse have reduced insecticide use to extremely low levels so that direct effects on other species is of negligible proportions.

Rapidly expanding human populations in Africa coupled with the consequent demand for land and the increasing hunger for food is resulting in several actions that, when combined, lead to the widespread degradation of the natural resource base, particularly in the more marginal areas for agricultural production.

It is in this latter context that interventions towards tsetse and *trypanosomiasis* need to be carefully considered if an integrated approach to disease control with optimum livestock production and good agricultural practices is to be achieved.

Present situation

It has often been said that tsetse may be regarded as either the «scourge or the saviour of Africa». The latter through protecting the natural resources of uninhabited areas and the former by preventing the utilisation of potential resources,

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decimating the livestock of those that are forced to settle in infested areas and creating overstocking and land degradation of non-infested areas. This is the dilemma facing tsetse and *trypanosomiasis* control planners when having to provide justification for their decisions. There are equally strong examples which show not only that tsetse flies discourage human invasion but also that their presence in natural areas, adjacent to settlements, may prove so intolerable that unless they are removed the natural habitat may itself be destroyed.

The growing demand for land from increasing populations will accentuate these conflicts. Thus, it is foreseen that over time the justification for *trypanosomiasis* control and eradication will strengthen, whilst, the argument that protection of the environment justifies the deliberate maintenance of a disease situation will become increasingly less acceptable.

As has been shown in the past, it is relatively easy to kill tsetse flies and suppress *trypanosomiasis*. What is not so easy is to consolidate this achievement towards enhanced and sustainable agricultural production. In this regard many previous activities can be considered as failures due to two major reasons. First, the twin tasks of land use planning and tsetse control were usually vested in different institutions operating independently from each other, resulting in delays in implementation of the land use component after the control phase and a subsequent loss of the control benefits due to fly reinvasion. Secondly, the contradiction that while it was considered more economic to eradicate tsetse from large areas the high cost of the follow up settlement schemes was often considered prohibitive.

As a result tsetse / *trypanosomiasis* activities have been allowed to proceed on an «ad hoc» basis with disease suppression being regarded as the ultimate objective. Such activities have, therefore, lacked coordination with development programmes and land settlement plans to the detriment of achieving sustainability.

A solution to these problems could be found in a more integrated approach of tsetse control. Tsetse control should be considered as a component of a general development package for a given area. One should first focus on priority areas where livestock owners experience a *trypanosomiasis* problem and build towards a future programme to include the controlled extension of agricultural land.

Livestock owners, being aware of the problem, could be organised in community involvement schemes using simple techniques such as traps and targets and ultimately taking tsetse control into their own hands with minimal technical supervision from outside.

This concept has already been applied in West and Central Africa to control human sleeping sickness. In East Africa, recent work gives hopeful results; in Western Ethiopia, voluntary peasants, who are also the beneficiaries, have actively participated in tsetse control operations. Strong emphasis was placed on progressive training of participants and coordination (5). At Nguruman, Kenya, the Masai, make, position and maintain traps which are used as «targets without insecticide». Furthermore, almost all the field staff are Masai

herdsmen who have been trained by the project (2,3).

This approach is expected to have the dual advantage of decreasing the operational costs and increasing efficiency. To enhance the feasibility of initiating and maintaining these self-help activities the support of adaptive research activities must be secured in order to modify techniques to a variety of local situations, to decrease maintenance demands, increase efficiency and reduce costs.

Future approach

The development of long term sustainable action against *trypanosomiasis* will depend on two major issues, the availability of the logistical and technical inputs and, more importantly convincing justification that benefits will exceed costs. Although *trypanosomiasis* is stated to be a major constraint in most infested countries this observation is very seldom supported by facts and figures. Tsetse distributions are not accurately known, drug usage and disease incidence unrecorded and production losses and benefits derived from control remain unquantified. As a result technical officers are unable to convince Governments of the need to allocate National funds who are then in turn unable to secure the external funding required to develop sustainable action programmes.

Future activities should include the collection of geographical and epizootiological information. This will help provide a better understanding of the agrosystems, provide an effective means of interpreting past and monitoring future changes in land use patterns. This could prove invaluable for defining appropriate control strategies and predicting their probable outcome (1). An example illustrating the influence of changing climatic conditions on disease patterns is found in West Africa where the chronic droughts experienced over the last 20 years coupled with a significant increase in livestock have brought about the forced southward migration of large numbers of animals in search of grazing. The national cattle population of the Central African Republic which, in 1970 was approximately 700,000, has now increased to nearly 2.5 million. This movement, which is largely irreversible in the short to medium term, from the tsetse free Sahelian region to the infested humid savannah and coastal regions has accentuated what is now an acute *trypanosomiasis* problem. This worsening situation has placed increasing demands on the supply of trypanocidal drugs and partly explains why actions undertaken to control the disease have not always fulfilled their objectives.

The development and adaptation of remote sensing may play a useful role within *trypanosomiasis* control and related development activities. The potential of NDVI's (normalised difference vegetation indices) for the identification of tsetse habitat and distribution is being examined, whilst satellite imagery in general is increasingly in use for land — use planning and environmental monitoring, both essential elements for the planning and productive use of tsetse controlled areas.

The success of any future approach to tsetse / *trypanosomiasis* control will depend on the ability of Governments and

individuals to sustain and consolidate their achievements. To ensure this, the problem must first be quantified for justification and then recognised as a national and eventually regional responsibility. Techniques for the control of *trypanosomiasis* and suppression of tsetse exist, new ones do not need to be invented, and they are all affordable when used in the appropriate manner. The approach should now be from the bottom up, the problem is so vast that community participation on a self help basis is essential if significant gains are to be made. Livestock owners and others who stand to benefit must be motivated to participate in control

programmes whilst, wherever possible, national services should be provided on a cost — recovery basis. The availability of easy — to apply technology will permit progress in this direction.

Except in isolated emergency situations tsetse / *trypanosomiasis* control must not be regarded as the ultimate objective but as a contributing element, integrated with other essential activities required to realise optimum agricultural production.

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