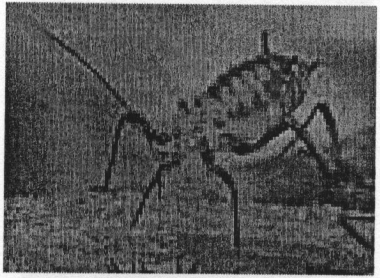
2.1.3 Ndomba Osmond A. (2003). Control of aphid-borne viruses of field beans (*Phaseolus vulgaris* L.) using plant extracts. (Supervisor: Dr. D. M. N. Mbewe)

A field experiment was conducted at Chilanga, Zambia (15°34 S', 28°19' E, 1,313m asl) during the 2000/2001 season to determine the effects of neem and tephrosia extracts on aphid-borne viruses of *Phaseolus vulgaris* L. (Fabaceae). The experiment was factorial and consisted of four treatments (extract combinations) in a Completely Randomised Design replicated three times. A mixture of *Vigna unguiculata* cv Lutembwe and *Phaseolus vulgaris* cv Mbala local were grown as spreaders to attract aphids and as source of viruses, respectively. Six species of aphids *Aphis gossypii, A. craccivora, A. fabae, Myzus persicae, Macrosiphum euphorbiae,* and *Picturaphis* spp. were identified on the plots. The aphids, which arrived in first week of trapping in the spreaders, were fewer than those in the study crop. The immigration



process was influenced by wind direction in both spreaders and study crop. Field disease syndrome revealed various levels of necrosis, mosaic, stunting and vigour failures; suggesting the presence of mosaic-producing viruses in the study crop. Treatments had no effect on all the parameters observed. However, there was 10% level significance for vigour per plot and number of plants exhibiting mosaic score scale 2. Assessment over weeks indicated that number of aphids per plot, number of plants showing mosaic score scale 1 and number of plants with mosaic score scale 3 were significantly different. Number of necrotic plants per plot was significant at 10% level. The interaction between treatments and weeks was not significant. The number of aphids which arrived into the study crop was highly correlated with number of plants showing mosaic score scale 1. The number of aphids was correlated to number of plants showing mosaic score scale 2 at 5% level of significance. Host range reactions suggested the presence of AMY, CMV, TsWV AND BYMV. Serological tests indicated that AMV and CMV infected the crop in the field. The number of pods per plant, plant height, grain yield and a 100-grain weight were not affected by treatments. A comparison was made using treatment means. It was found that both neem and tepbrosia have antifeedant effect on aphids but the effect was not systemic. It was further noted that tephrosia was more effective than neem. When tephrosia was applied along with neem, the effect was slightly reduced. It appears that the methodology of the work could be improved in many ways for better results. It has been suggested that further studies be carried out before confirming about transmission efficiency of aphids. The nature of necrosis and mosaic should thoroughly be studied before inferences are drawn. Studies with BCMV and BCMNV require that the presence or absence of dominant I gene in the bean cultivar is confirmed. Where multiple strains of a virus are expected to exist, use of polyclonal antibodies is recommended. Finally, as the viruses studied are nonpersistently transmitted, it is thought that the extracts were ineffective because they were not fast enough to kill the aphids before acquisition and inoculation.