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Crop yield monitoring in Eastern Africa

Bulletin for rain-fed maize, sorghum and pasture yield prospects in 2004

MARS-FOOD

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PASTURE SEVERLY AFFECTED, MAIZE YIELD PROSPECTS BELOW AVERAGE AND SORGHUM NEAR NORMAL

The main 2004 crop season is characterized by a drought that affects mainly the eastern part of the IGAD region. The drought lead to a critical food security situation for the agro- pastoralists of Somalia, Ethiopia (mainly Somali region) and Kenya (Coast and North Eastern Provinces mainly). Whereas the maize yield is forecasted lower than 2003 yield, the analysis up to the end of September indicates near normal yield of sorghum for the whole region. Mixed signals about crop conditions of sorghum in Eritrea and some districts in Sudan cause concern.

Maize

The maize yield estimate is overall lower than the 2003 yield for the whole region, due to scarce and badly distributed rainfall (Figure 1, a). Ethiopia (mainly in the low production areas of Somali, Afar and southern part of Oromiya) and Kenya, which are the largest maize producing countries in the region, are affected by the dry spell.

Sorghum

The sorghum yield estimates up to the third dekad of September are overall slightly higher than the 2003 yield for the whole region. Below normal rainfall during this month could affect the final sorghum yield in Eritrea and some districts in Sudan. Mixed signals are received for both countries during September with positive results from the water balance model but vegetation indicators showing a large decrease in the vegetation activity (Fig. 4, Pag.5).

Pasture

Special attention has been given to Somalia and Kenya where most pastoralist areas present a large decrease of the vegetation activity showed by the SPOT VGT satellite (Figure 1, c).

The main regions affected in Somalia are Tog-Dheer in the north, Galgadud in the centre and Middle and Lower Juba in the south of the country. In Kenya the provinces concerned by the drought are: Coast, North Eastern, Eastern and the north of Rift Valley (mainly Turkana district).

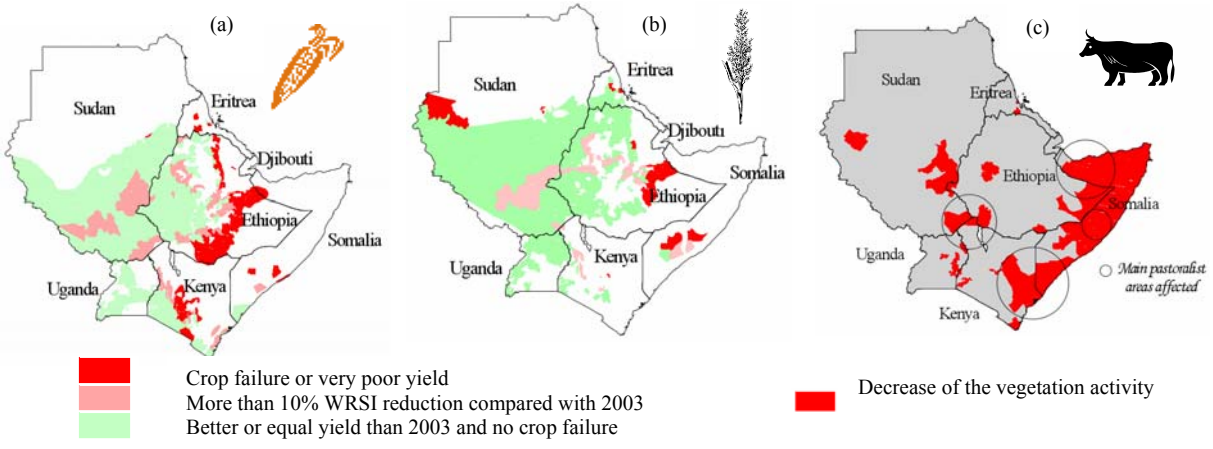

Figure 1. (a) and (b) Comparison of the WSI for maize and sorghum with the previous crop season respectively. (c) Areas in red, showing mainly the pastoralist areas, present a large decrease in vegetation activity captured by the sensor of SPOT VGT satellite.

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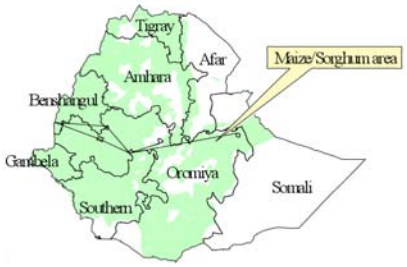
COUNTRY OVERVIEW[1]

Eritrea

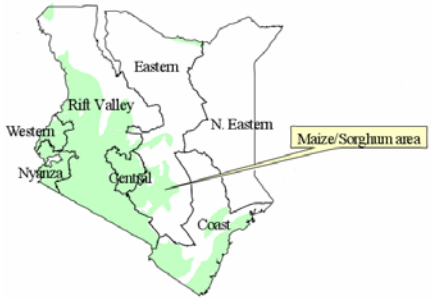
Below normal rainfall during September could affect the main sorghum areas. The NDVI profiles show a large decrease in vegetation activity for the whole country. The results of the water balance indicate that the less affected areas are Gash-Barka and Debub.

Ethiopia



The Somali region, even if normally a dry area, is the most affected region of Ethiopia having experienced consecutive drought for the last five years. Pastoral areas of Somali and Afar regions were also affected by the poor rainfall. Good maize and sorghum yield are expected in the highlands of Ethiopia.

Kenya



A decrease in maize yield is forecasted for the current crop season. Pastoralist areas are the main concern where the most affected provinces are: Coast, North Eastern, Eastern and the north of Rift Valley (mainly Turkana district).

Somalia

Somalia is having the most critical food insecurity situation of the whole region. The drought affects the agricultural and pastoralist areas. For the latter, two very dry years have led to extremely hard conditions. SPOT VGT satellite images show that most of country presents below normal vegetation activity (Figure 10).

Sudan

In general the sorghum situation seems near normal but there is a decrease in vegetation activity that cause concern in the following districts: Gedaret, Rufaa, Dinder, Es Suki, Ma Tuq, Kawa, Dilling, Kosti, El Dewiem, Bara, Rabak, Singa, Umm Ruwaba, Sennar, El Obeib, En Nuhoud, Omkadada, El Fashir, Keb Kabiya, El Gyneina, Zainge, El Managuil, El Hawata, Goz Regeb, El Renk and Kapoeta.

Uganda

In general the crop situation is good, with some pocket areas where a yield reduction could be expected, mainly in Lira, Soroti, Apac, Kumi, Mamuli and Iganga regions.

[1] The areas where maize and/or sorghum are grown are show here for information. The current crop situation maps corresponding to the text are given at the end of the bulletin.

Rainfall analysis

Figure 2 shows the dekadal rainfall of September. Note that Eritrea received very low rainfall during this month. This is critical because most of the crops are at the late vegetative and flowering stage. Those stages are very sensitive to water stress.

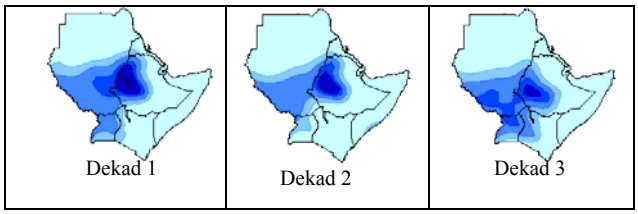


Figure 2 Dekadal rainfall in mm during September 2004. Data derived from the ECMWF model.

The difference between current and normal cumulated rainfall is shown in the map of Figure 3, Page 4.

The graphs in Figure 3 represent the comparison between cumulated current rainfall and cumulated normal, spatially averaged by country and taking into consideration only the areas planted with maize and sorghum.

Vegetation index analysis

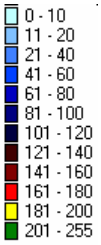
The difference in the vegetation index (NDVI) between September 2004 and the same month of the previous year shows some areas with negative differences mainly in Eritrea and Sudan. (Figure 4, Page 5).

The negative differences observed are due to the irregular and insufficient rainfall during the month of September.

Figures 7 to 12 show the results of the administrative NDVI temporal analysis. The analysis includes even administrative units outside the maize and sorghum growing areas to give the reader information about conditions of pastures.

Crop water requirement

Figure 5 and 6 show the Water Requirement Satisfaction Index (WRSI), a yield indicator obtained by using the FAO Crop Specific Water Balance (CSWB) model.



Figures 5 and 6 represent a forecast of WRSI for maize and sorghum respectively at the end of the growing season. Long-term average climatological data are used to calculate the WRSI for the period between the current dekad and the end-of-season.

In general the regional maize situation seems worse than the previous crop season. The maize yield expectation is lower for Somalia, Kenya and Ethiopia compared to 2003.

Even if the WRSI shows a very good yield expectation for Uganda, the NDVI temporal analysis done at administrative level, reveals some units with large decrease of vegetation activity which should lead to important yield reduction (Figure 12).

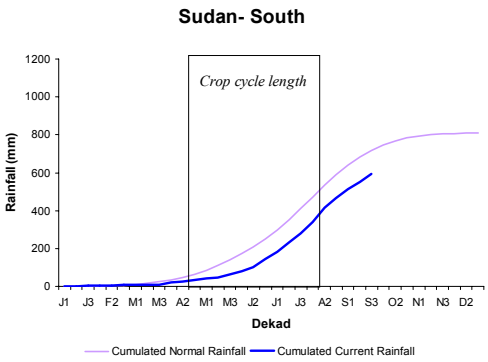
On the other hand near normal sorghum yield are forecasted for the whole region (Fig. 6, Page 7). Nevertheless the NDVI temporal analysis shows a large decrease in vegetation activity for the whole Eritrea and some districts in Sudan during September that cause concern.

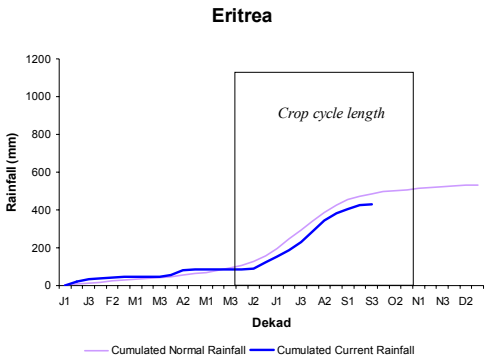
The JRC, in collaboration with FAO is pleased to present this issue of "Crop yield monitoring in Eastern Africa" for the 2004 crop season.

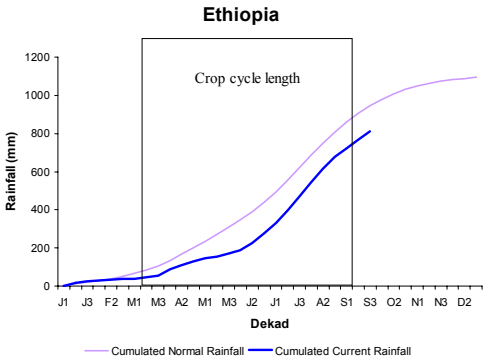
MARS-FOOD will provide regular monthly updates on the progress of the 2004 crop season. The bulletin will be available in the "Crop and Rangeland Monitoring Network for the Greater Horn of Africa": http://agrifish.jrc.it/Africa/ or ftp://agrifish.jrc.it/bulletin/ Also MARS-FOOD crop monitoring products will be available through the JRC Digital Map Archive: http://dma.jrc.it.

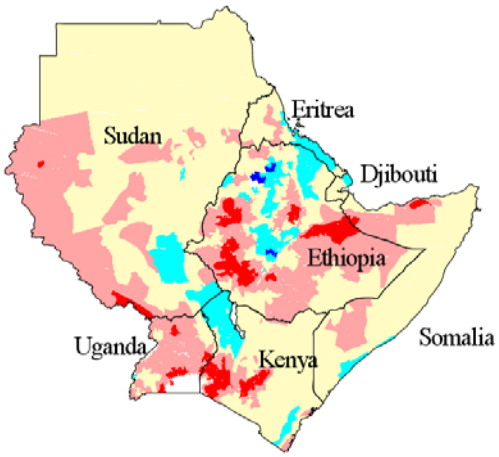
Another useful product for Somalia is available on: ftp://agrifish.jrc.it/Bulletin/Somalia

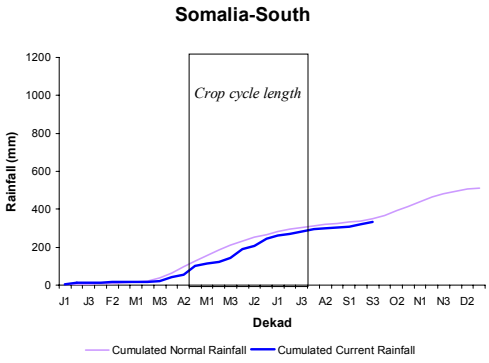
Comments and remarks for improvement of this bulletin are welcome.

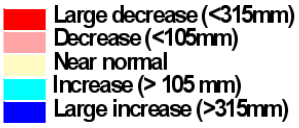


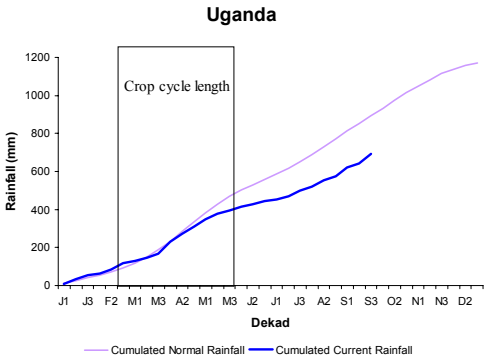












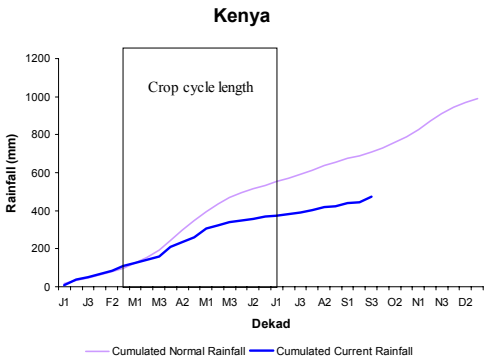
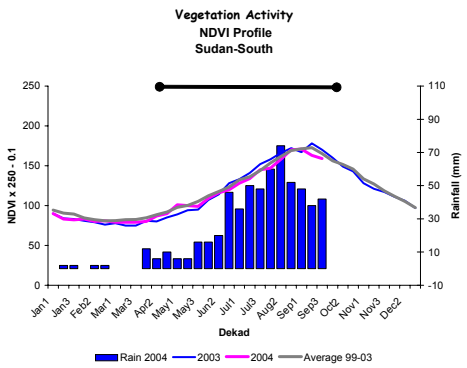
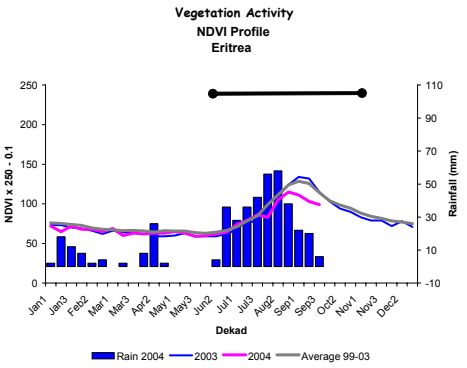
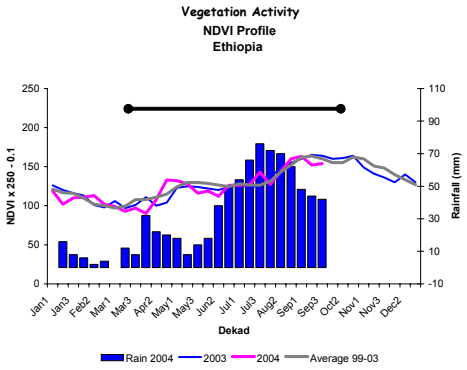
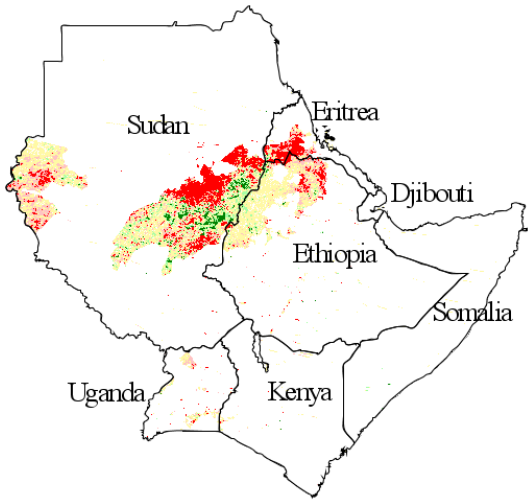


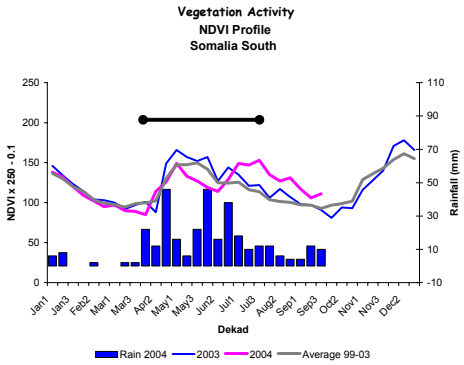
Figure 3 Rainfall difference with the cumulated normal up to the 3rd dekad of September 2004. Data are derived from the ECMWF model. Cumulated actual rainfall compared with normal in the graphs was spatially-averaged taking into consideration only the areas cultivated with maize and sorghum.

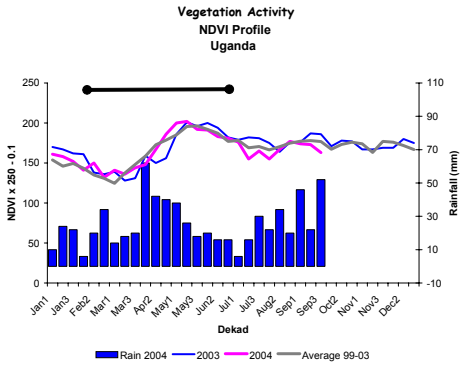


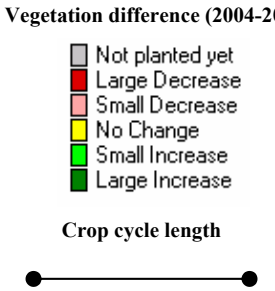












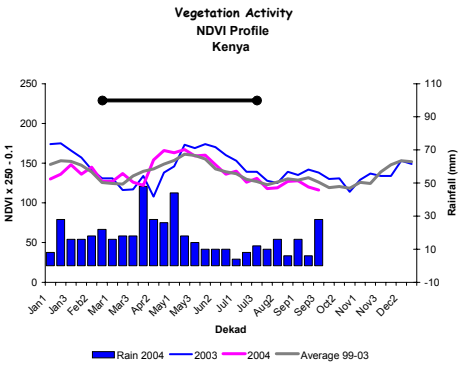


Figure 4 Normalized Difference Vegetation Index (NDVI). Absolute difference between September 2004 and the same month of the previous year. The areas that were not planted with sorghum and the areas, in which the crop cycle is completed, have been masked-out.

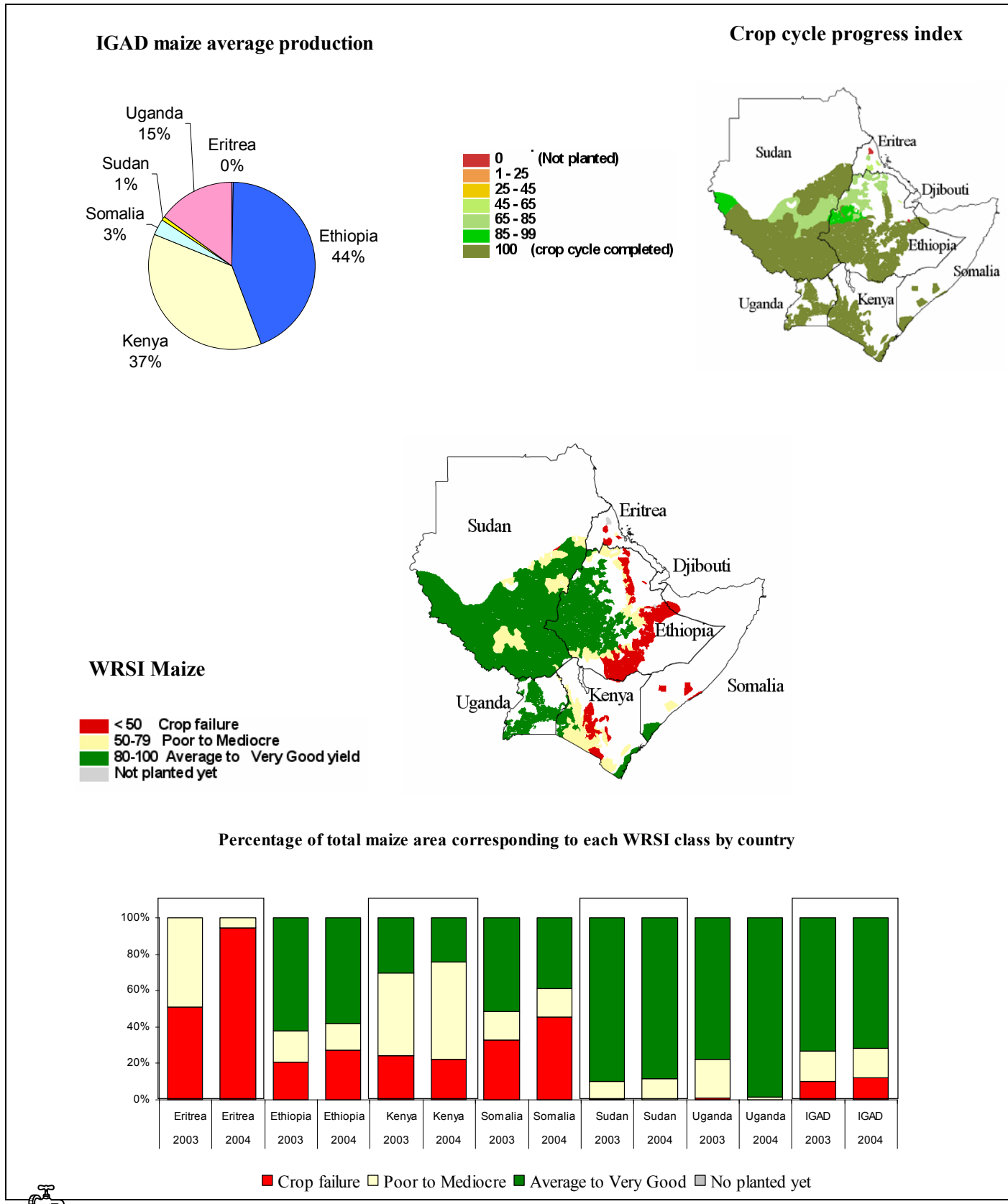


Figure 5. Water Requirement Satisfaction Index for maize 2004 (central Map) and comparison between WRSIs 2003 and 2004 (Bar graph)**.** For the whole region the situation of the rain-fed maize seems slightly worse than in 2003. In the areas where the maize cycle is not completed, normal rainfall was used to obtain the final value of WRSI. For these areas the WRSI values have to be considered as an early forecast for the crop yield situation (see Crop cycle progress index).

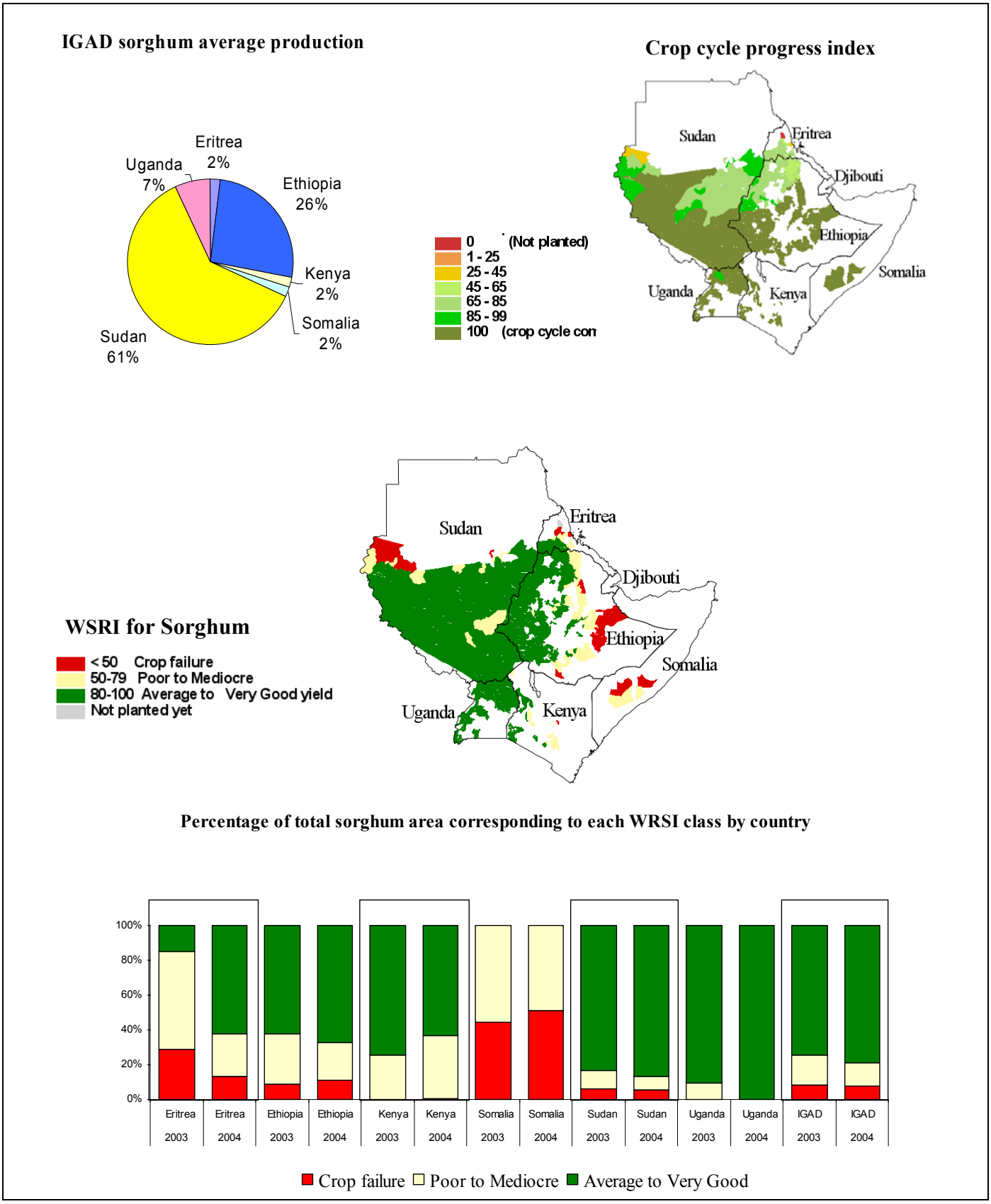


Figure 6 Water Requirement Satisfaction Index for sorghum 2004 (central Map) and comparison between WRSIs 2003 and 2004 (Bar graph)**.** For the whole region the situation of the rain-fed sorghum seems slightly better than in 2003. In the areas where the sorghum cycle is not completed, normal rainfall was used to obtain the final value of WRSI. For these areas the WRSI values have to be considered as an early forecast for the crop yield situation (see Crop cycle progress index).

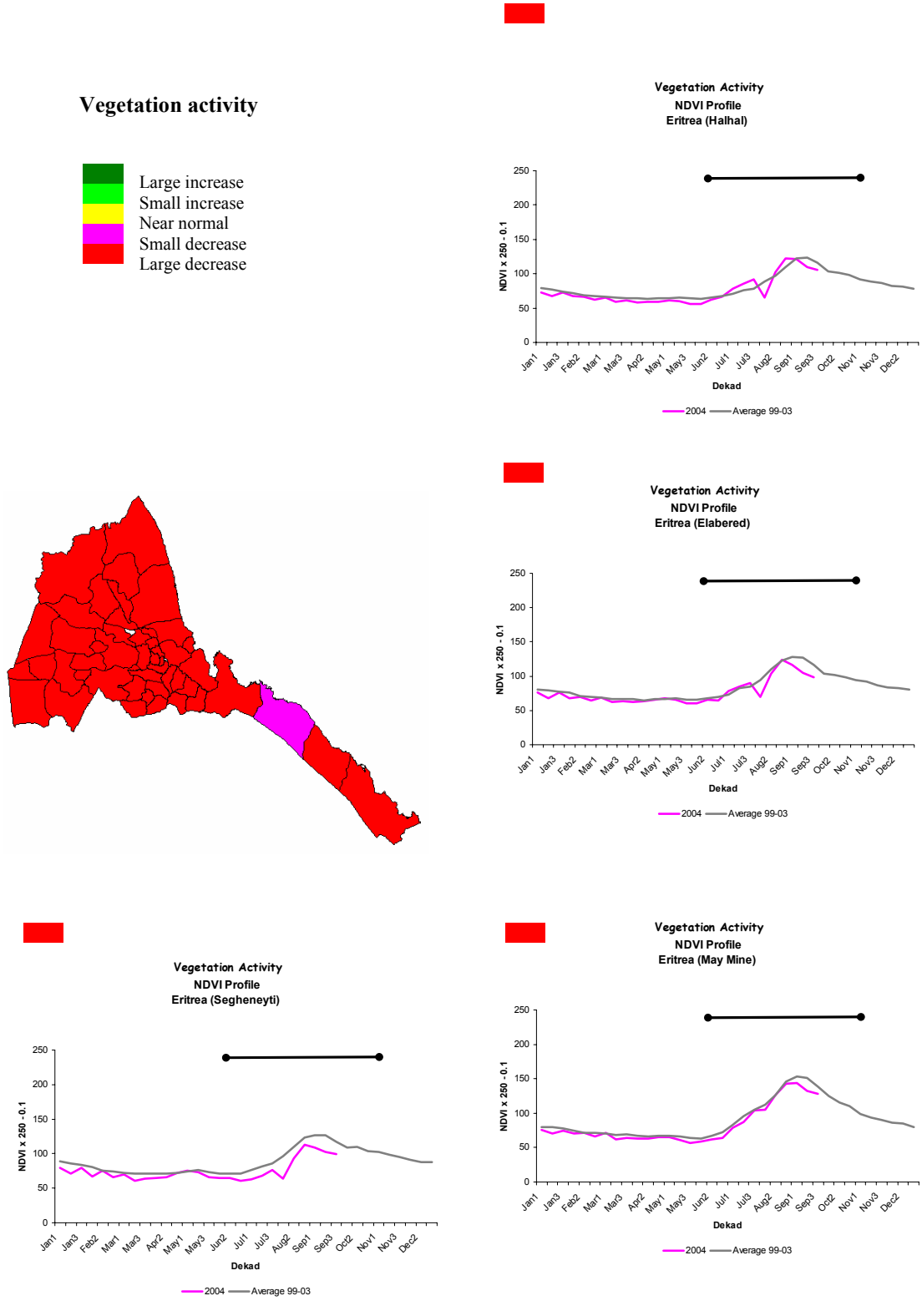


Figure 7 Administrative NDVI profiles for Eritrea. For most of maize and sorghum's areas the vegetation activity is classified as near normal or slightly better than normal based on the NDVI profiles.

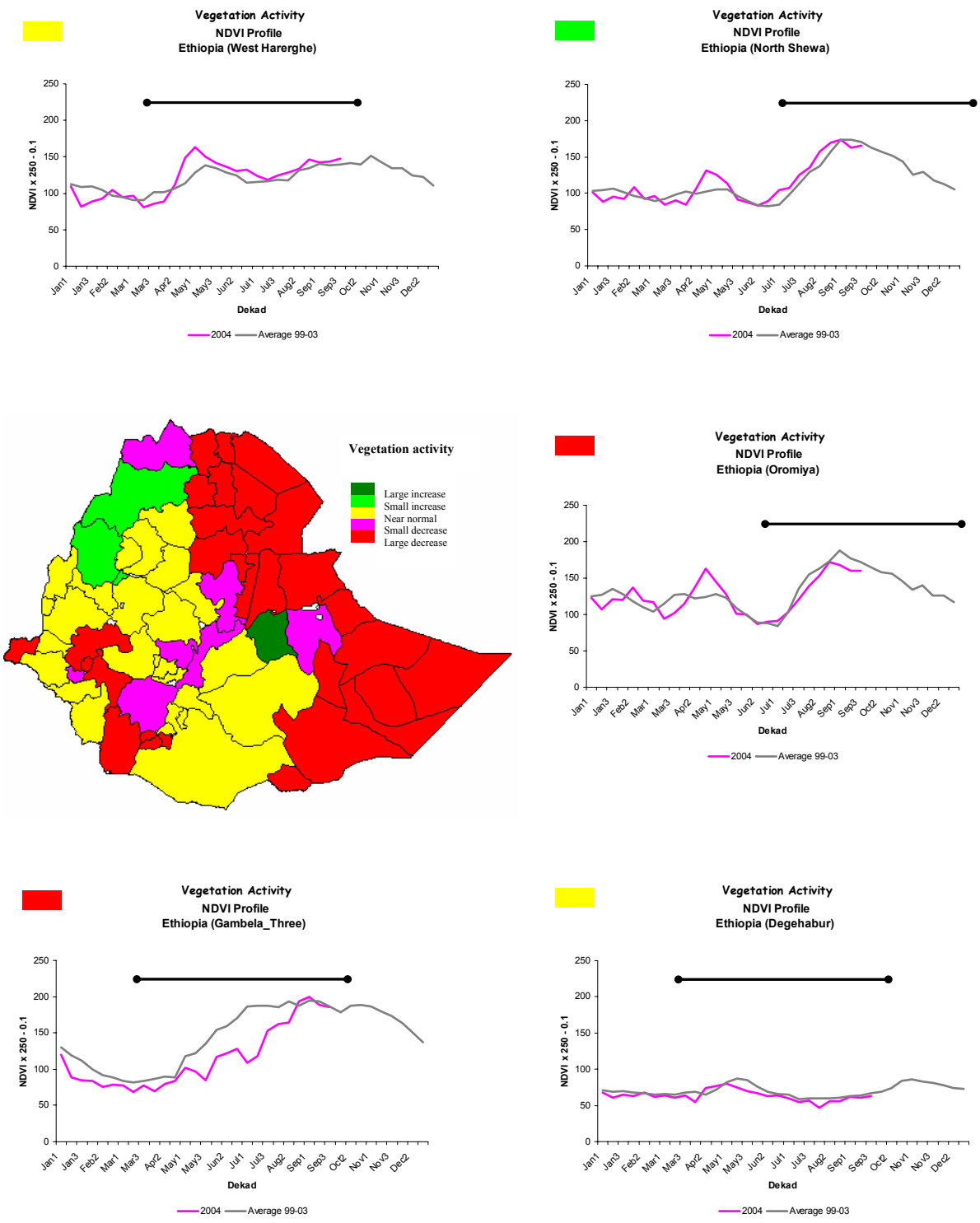


Figure 8 Administrative NDVI profiles for Ethiopia. Mainly the districts of Somali, Gambela and western part of Oromiya regions are affected by drought showing a decrease of the vegetation activity**.**

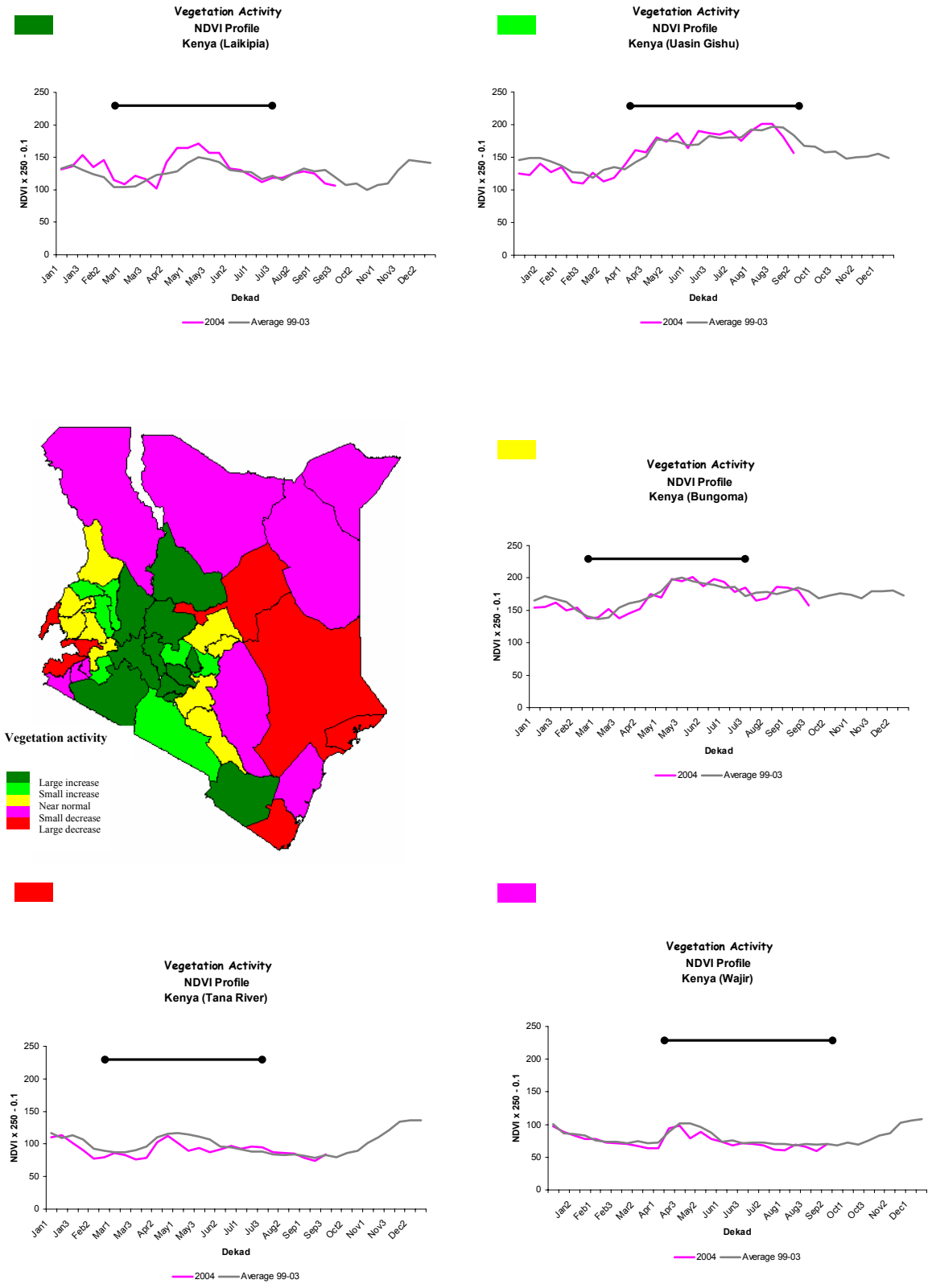


Figure 9 Administrative NDVI profiles for Kenya. Mainly the districts of Coast, Nyanza, and northern part of North Eastern, Eastern and Rift Valley are affected by drought showing a decrease of the vegetation activity**.**

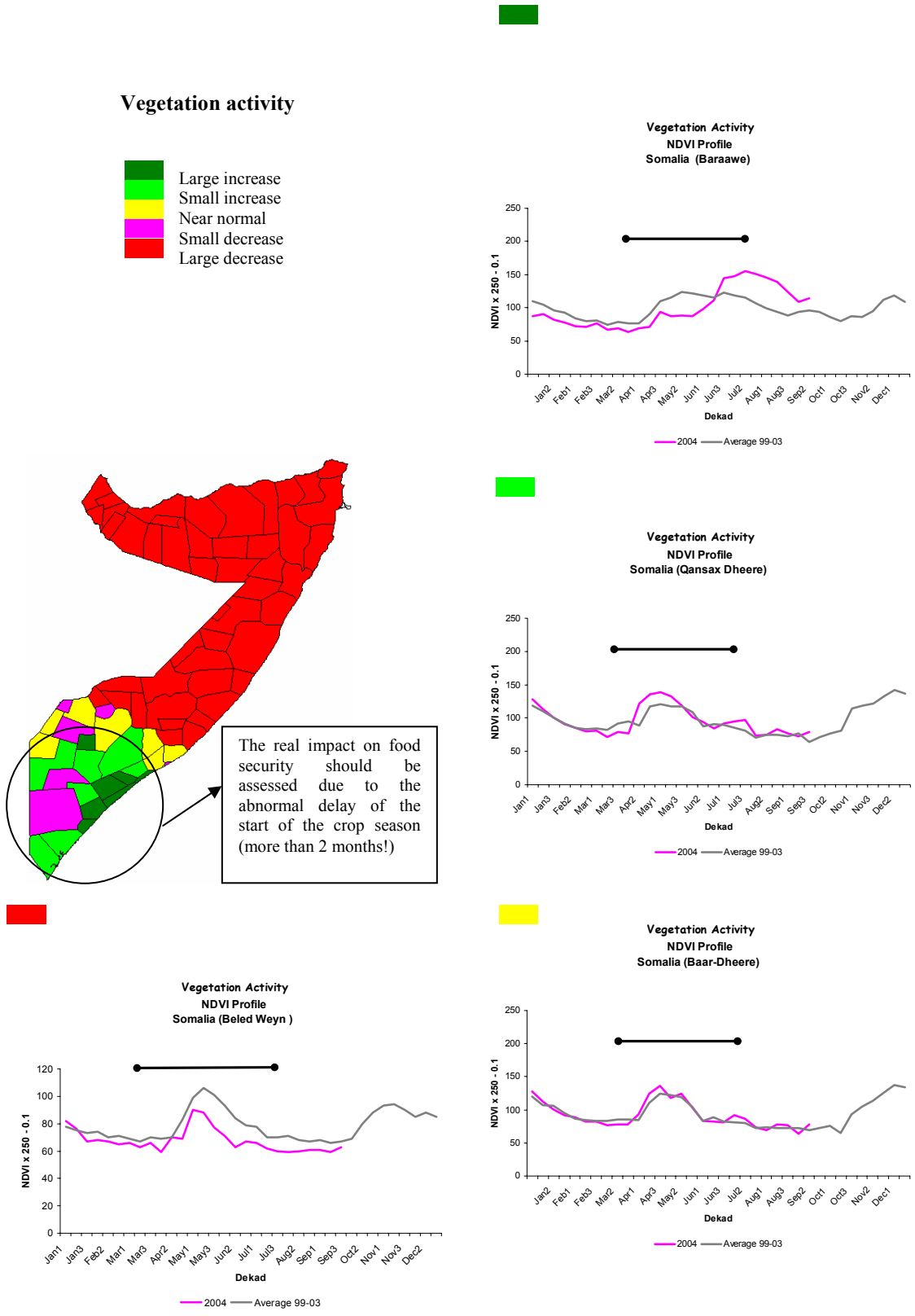


Figure 10 Administrative NDVI profiles for Somalia. Most of the country is affected by the drought.

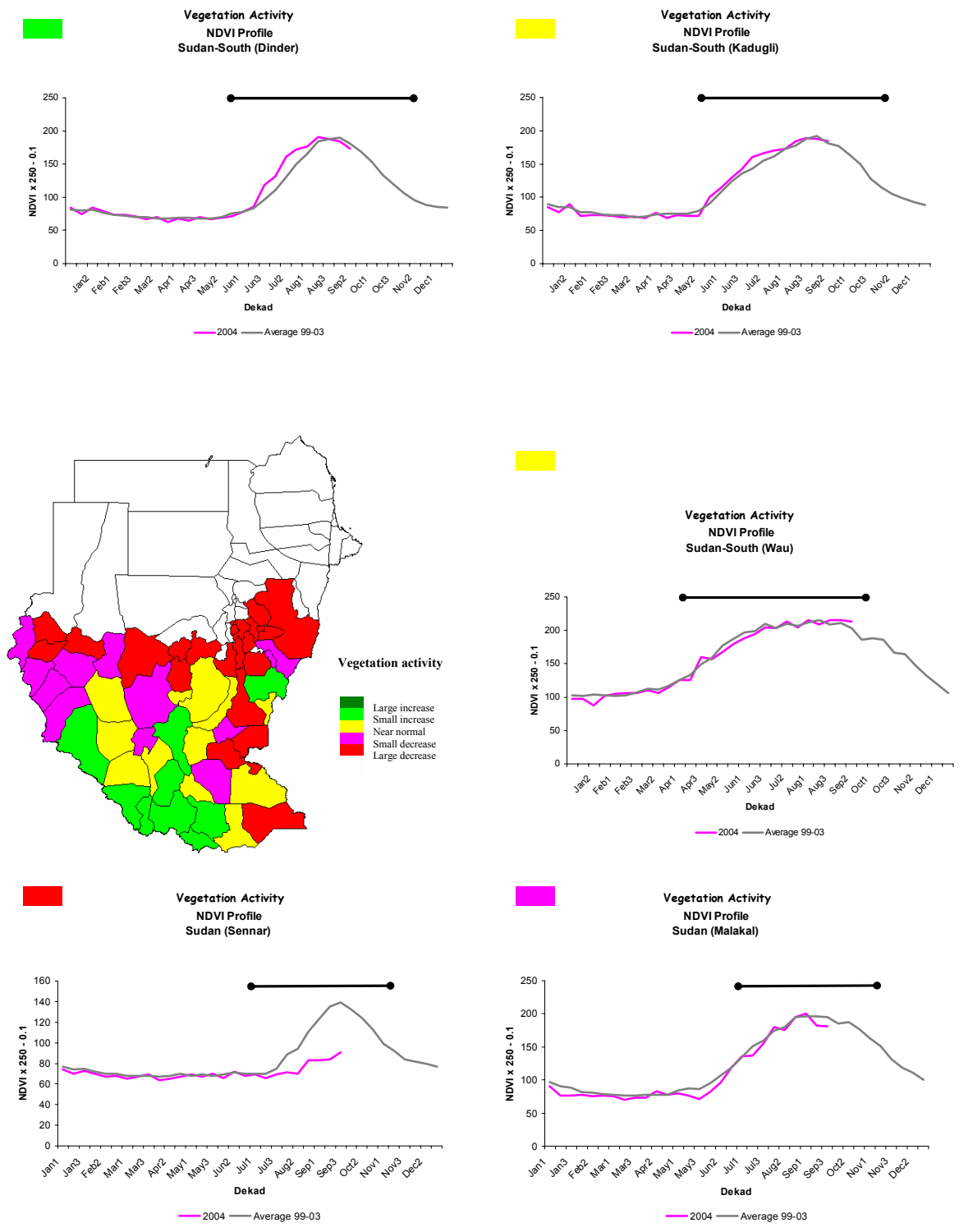


Figure 11 Administrative NDVI profiles for Sudan. The districts of Juba, part of Junglei, Upper Nile and Southern Darfur show a decrease of the vegetation activity.

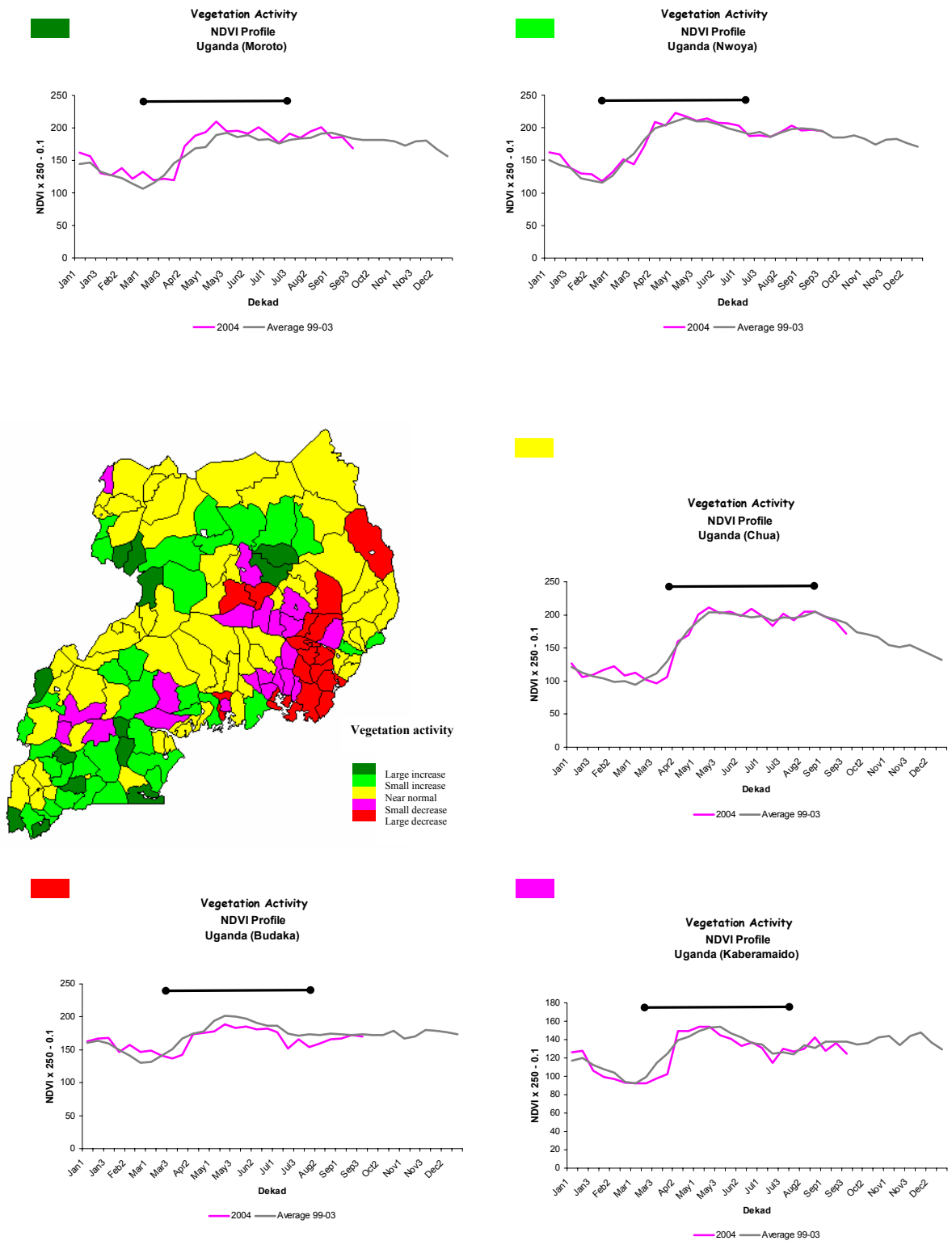


Figure 12 Administrative NDVI profiles for Uganda. Mainly the districts of East Province show a decrease of the vegetation activity.