

## 灰系統理論在生物學之應用：

### (6) 氣象因子影響 SPOT 衛星遙測草坪生長之灰關聯分析

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#### 摘要

本研究應用 2004 年 9 幅之 SPOT 衛星遙測資料，監測台中國際高爾夫球場西區球道結縷草(*Zoysia* spp.)及中、東區球道百慕達草(*Cynodon* spp.) Tifway-419 常態化差異性植生指數 NDVI 之季節性變化；並以灰關聯理論分析五種氣候因子(即累積降雨量、平均相對溼度、日照率、平均氣溫與累積全天空輻射量)對草坪植被衛星遙測 NDVI 之相關性。台中國際高爾夫球場球道草坪之法國 SPOT 衛星遙測植生指數 NDVI 呈現季節性變化，全年介於 0.1-0.5 之間，在 2、3 月降至最低，春天 4 月後逐月增高，夏季 8-9 月達到最高峰，可達 0.5 左右，而後進入秋冬季而逐月下降。依灰關聯分析顯示，五種氣候因子對結縷草及百慕達草 Tifway 419 衛星遙測 NDVI 之貢獻度為：平均氣溫 > 累積全天空輻射量 > 相對濕度 > 日照率 > 累積降雨量。日光相關因子之平均氣溫與累積全天空輻射量對結縷草及百慕達草 Tifway 419 衛星遙測 NDVI 之貢獻比相對濕度及累積降雨量二種水分相關因子都大。

關鍵詞：衛星遙測、草坪、氣候因子、常態化差異性植生指數、灰關聯分析。

## **Grey relational analysis of the effects of climate factors on turfgrass growth monitored by SPOT satellite remote sensing data.**

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### **Abstract**

This research studied the seasonal change of zoysiagrass (*Zoysia* spp.) and bermudagrass (*Cynodon* spp.) Tifway-419 normalized difference vegetation index (NDVI) monitored by the SPOT satellite remote sensing imagery of 2004, and applied the grey system theory to analyze the relationship between NDVI of turf canopy and five climate factors including monthly cumulative precipitations, monthly mean relative humidity, daily insolation percentage, monthly mean temperature and daily cumulative irradiance. The NDVI of SPOT remote sensing data for fairway turfgrass of Taichung International Country Club were presented seasonal change. It was between 0.1-0.5 in the whole year. NDVI was the lowest in February and March, increased after April, and reached the highest 0.5 in August and September of summer, then decreased in autumn and winter season. The grey system theory was applied to pinpoint the effect of five climate factors on the satellite remote sensing NDVI of zoysiagrass and bermudagrass Tifway-419. The contribution degrees of climate factors, indicated by grey order, to satellite remote sensing NDVI of zoysiagrass and bermudagrass Tifway 419 were: monthly mean temperature > daily cumulative irradiance > monthly mean relative humidity > daily insolation percentage > monthly cumulative precipitation. The data further suggest that sunlight-related factors (SRFs) play more important role in satellite remote sensing NDVI of zoysiagrass and bermudagrass Tifway 419 than water-related factors (WRFs).

Keywords: Satellite remote sensing, Turf, Climate factors, Normalized difference vegetation index (NDVI), Grey relational analysis.