

Natural Grass Sports Pitches – Is It That Difficult to Maintain? 天然草地球場: 是否真的難於保養?

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Myths on Natural Grass Sports Pitches - 1

有關天然草球場的一些荒誕說法 - 1

- **Natural grass pitches are difficult if not impossible to maintain, hence not workable**
- **Tifton 419 and its kin are not a suitable turfgrass for sports pitches**
- **Carpet grass is the best turfgrass for sports pitches**
- **All-sand-based rootzone is not good for growing grass**
- 天然草地球場是很困難甚或不能護養,因此是不可行的
- 雜交百慕達及其他相關的草不適用於運動場
- 大葉草是最好的運動場用草
- 用純沙種草是不可行的

Myths on Natural Grass Sports Pitches - 2

有關天然草球場的一些荒誕說法 - 2

- **In order to break these myths, I have to start from the very basics**
- **How to make your natural grass pitch last longer?**
- 為了破除這些荒誕說法,我必需要由最基本上來解說
- 如何能令你的天然草球場持續耐久?

How to Build a Sustainable Natural Turf Pitch?

如何去建造一個可持續的天然草球場

- Will have to start from the very beginning, i.e. constructing it right!
- Then it has to be managing it right!
- With the mindset right
- 一定要由開始做起，亦即要建造得正確！
- 然後是管理/護養得正確
- 及有正確的心態

如何去建造一個可持續的天然草球場

How to Build a Sustainable Natural Turf Pitch?

- **DESIGNING STAGE**

- 1. Rootzone Profile

- a.) Sand-based/“Soil”- based
 - b.) Physical amendants added or not, e.g. fiber, mesh element, etc.

- 2. Drainage System

- a.) Surface Drainage, Camper & Cross-fall
 - b.) Drainage Layers
 - c.) Subsoil drainage pipe

- 3. Choice of Grass(s)

- a.) Hybrid Bermudagrass
 - b.) Zoysia Grass
 - c.) Seashore Paspalum
 - d.) Carpet Grass

- 4. Assessment of Site Constrains, e.g. Shading effect, etc.

- 5. Procurement of Machinery

- **設計階段**

- 1. 根系層

- a.) 全沙/全“泥”
 - b.) 要否添加物理性的輔助物,例如纖維, 尼龍網片等.

- 2. 疏水系統

- a.) 表面疏水 - Camper及地面坡度
 - b.) 疏水層
 - c.) 疏水管

- 3. 草的選擇

- a.) 雜交百慕達
 - b.) 結縷草 (x2)
 - c.) 海濱雀稗
 - d.) 地毯草(大葉草)

- 4. 場地限制之評審,例如遮蔭效果

- 5. 機器之採購

Rootzone Profile Construction

根系層之建造

- **All-Sand-Based Profile**
- 全沙質之根系層
- **All-Soil-Based Profile**
- 全“泥”質之根系層

All-Sand-Based Profile

全沙質之根系層

All-Sand-Based Profile

- Depth
- Grading
- Purity
- Shape
- Infiltration
- Porosity
- Examples: Tseung Kwan O Sports Ground, Sai Tsao Wan Sports Ground, etc.

全沙質之根系層

- 厚度
- 沙粒大、小之分佈
- 純度
- 形狀
- 滲透(水)率
- 孔績率
- 實例:將軍澳體育場, 晒草灣體育場

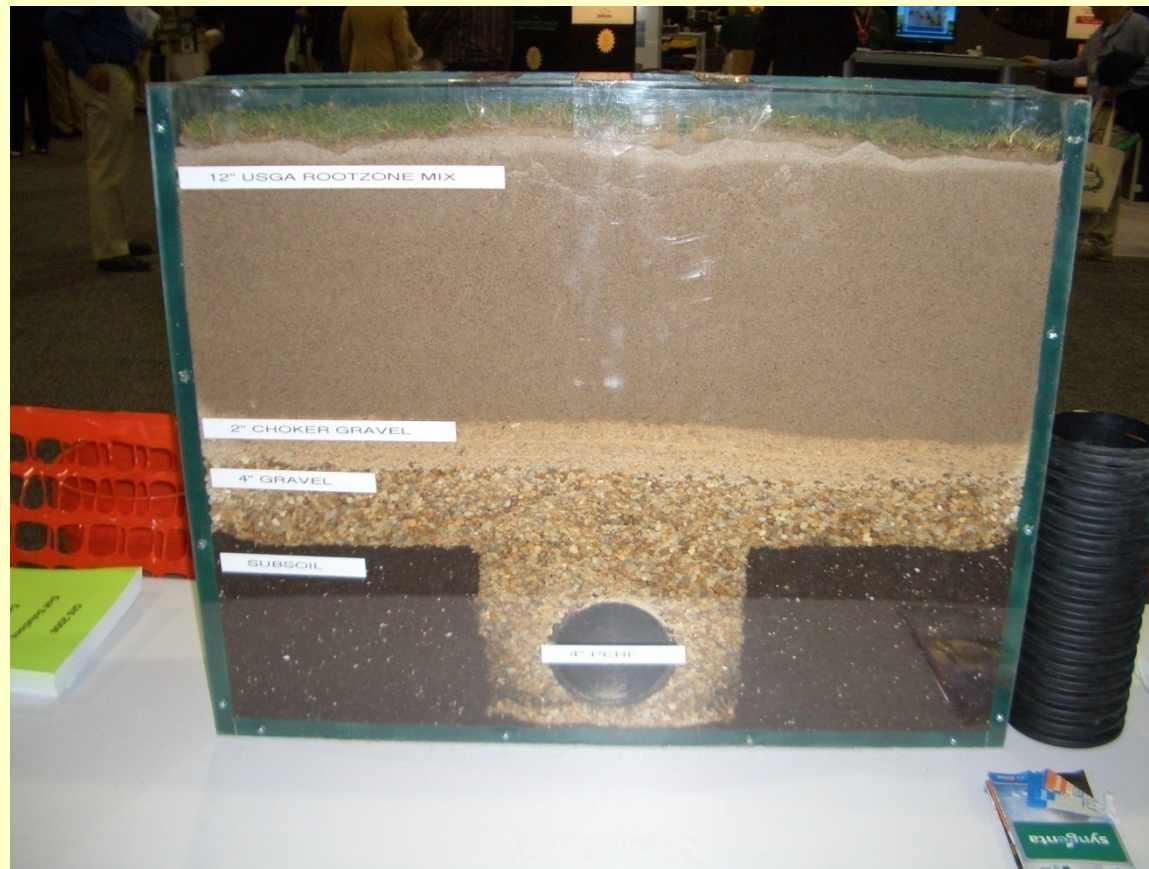
只採用優質的沙

Use Quality Sand Only



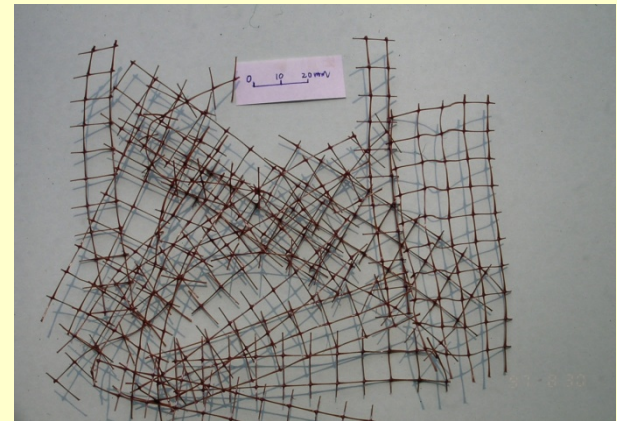
Typical All-Sand-Based Profile

典型之全沙質根系層



Physical Amendants

物理性的辅助物,



All “Soil”– Based Profile

全“泥”質之根系層

All- “Soil” – Based Profile

- As no topsoil is available in Hong Kong, only fabricated soil is used
- Composition of the fabricated soil - CDG :Sand: OM = 5:3:2
- Depth
- Physical amendant added?
- Examples: Joint University Sports Ground, Dr. Stanley Ho Sports Ground, HKU, etc.

全“泥”質之根系層

- 由於香港沒有真正的土壤, 因此只可採用混成土
- 混成土之組成比率 - “黃花沙” : 沙 : 有機物 = 5:3:2
- 厚度
- 有否加添物理性的改良物
- 實例: 聯校體育場, 香港大學何鴻生體育場

“泥層”的厚度

Depth of the “Soil” Layer

- There are other specification asking for a “soil” layer 400mm or above. Do we really need 400mm?
- Check the drainage.
- 有些規格要求 400mm或以上.有此需要嗎?
- 對疏水的影響

Construction of Drainage System

疏水系統之建造

- **Use compatible material**
- **Achieving the right perch water table**
- **Drainage rate**
- **Porosity**
- 使用可相容的物料
- 達到正確的 **Perch Water Table**
- 疏水速率
- 孔隙大小適中

Drainage System

疏水系統

Drainage System

- a.) Surface Drainage:
Camper, Cross-fall,
weep hole & U-channel
- b.) Drainage Layers
- c.) Subsoil drainage pipe
- d.) Catch pit/outlet

疏水系統

- a.) 地面疏水:中央向四方之
坡度, 地面坡度, 疏水孔及
U渠
- b.) 疏水層
- c.) 地下疏水管

Sub-Soil Drainage System – 1

地下疏水系統的建造 - 1



Sub-Soil Drainage System Laying – 2

地下疏水系統的建造 - 2



Aggregate Drainage Layer Laying

碎石疏水層的建造



Sand Rootzone Layer Laying

沙根系層的建造



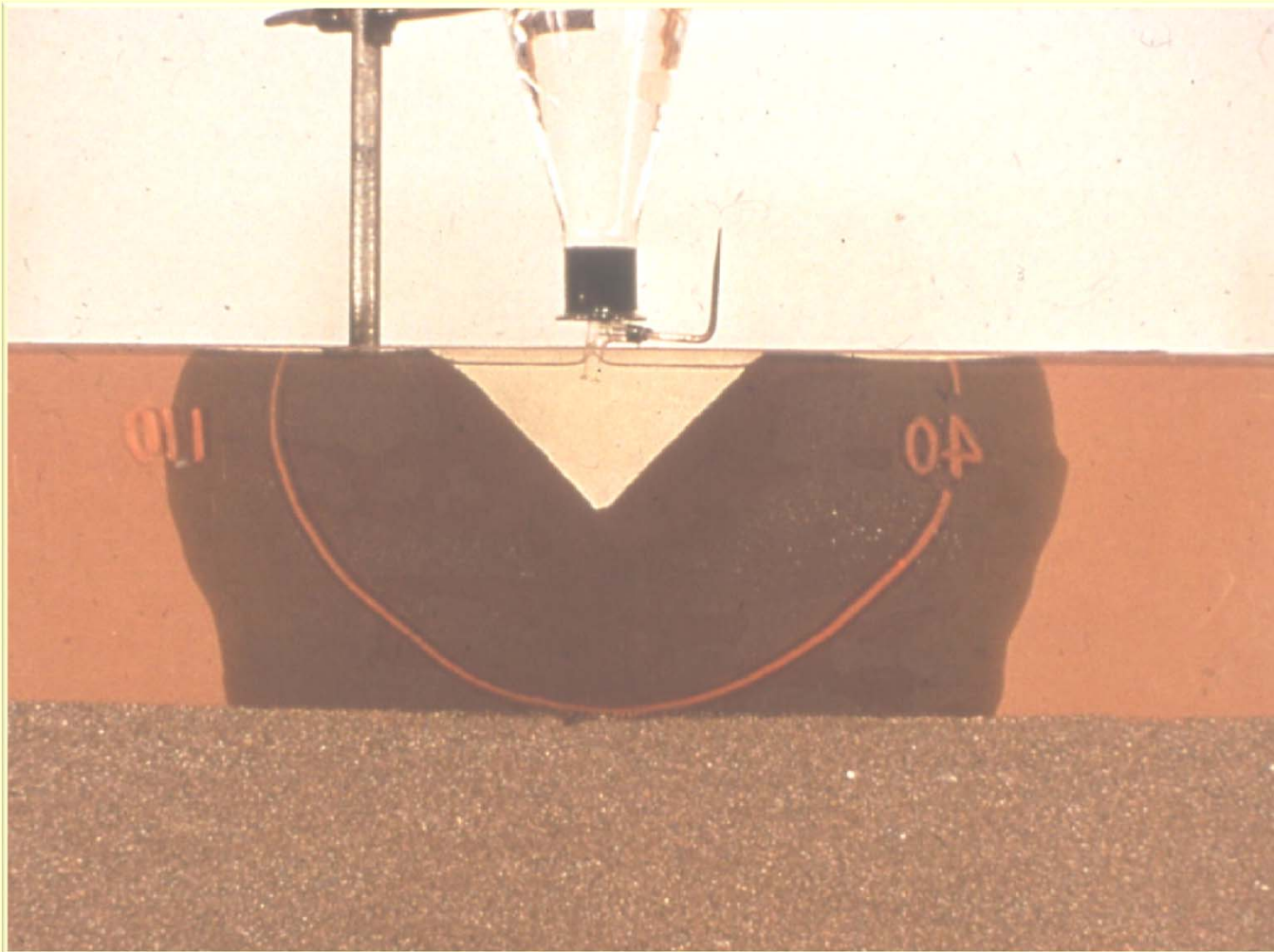
Vertical Profile of the Turf Pitch

草地球場的垂直切面



Perched Water Table

Peter Semos Photo



Choice of Grass

草種的選擇

- Hybrid Bermudagrass
- Zoysia Grass
- Carpet Grass
 - + Hilo Grass
- Seashore Paspalum
 - +
- Perennial Ryegrass*
 - (*For Over-seeding)
- 雜交百慕達草
- 結縷草(2 種)
- 大葉草
 - + 雙耳草
- 海濱雀稗
 - +
- 多年生黑麥草*
 - (*冬季蓋種用)



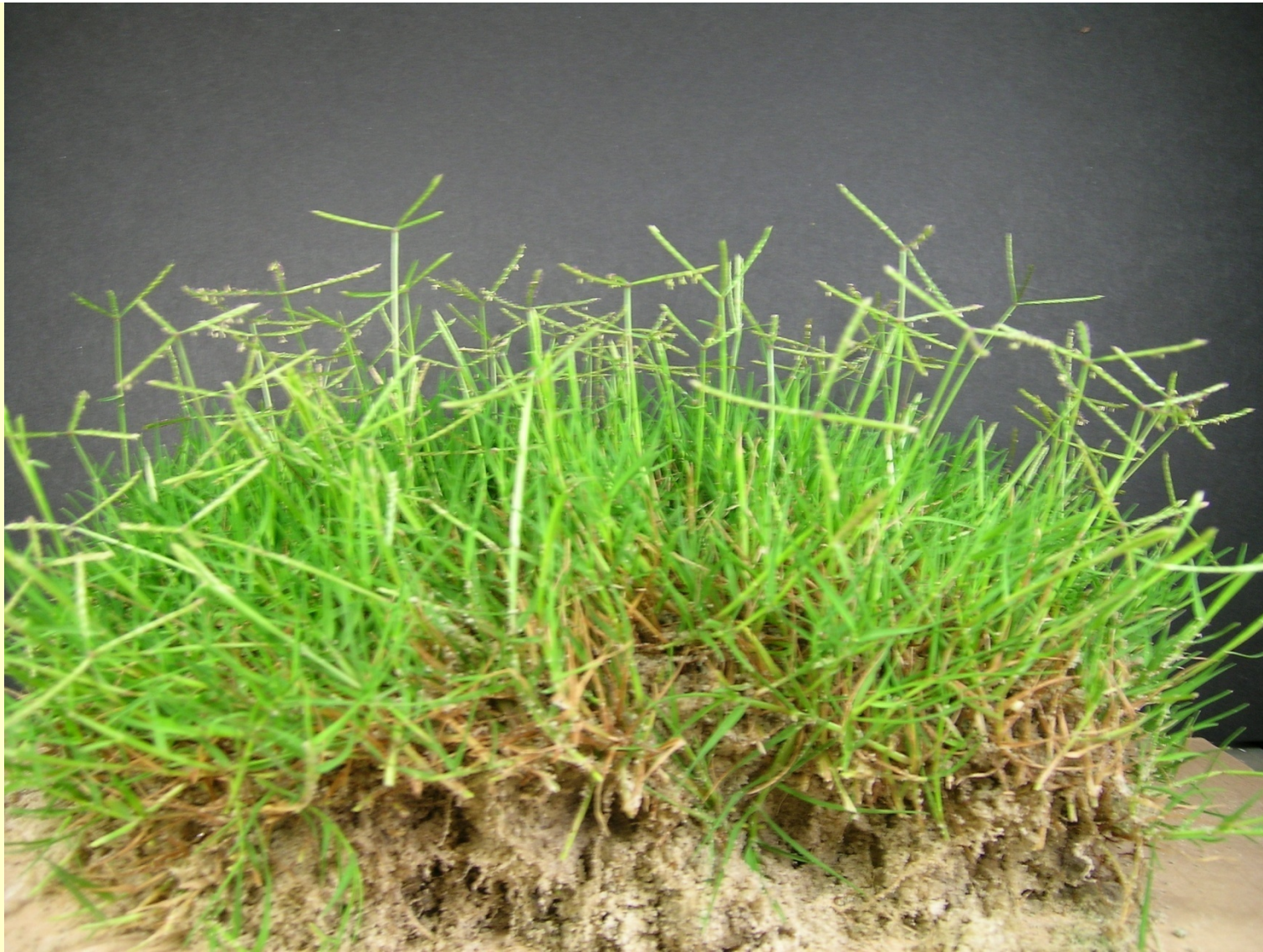
草皮 – Sod



地毡草 Tropical Carpet Grass



双耳草 Hilo Grass



雜交百慕達草- 天堂草
Hybrid-Bermudagrass –Tifton Grass



結縷草 Zoysia Grass



海濱雀稗 Seashore Paspalum

香港體育場地常用的草坪草

Common Turfgrass Used on Sports Fields In HK

1. Carpet Grass + Tilo Grass:
e.g. Mok Kok Sports Grounds,
Shiu Sai Wan Sports Grounds,
Happy Valley Infield Sports
Grounds, etc

2. Hybrid Bermudagrass: e.g.
Hong Kong Stadium, Dr. Stanly
Ho Sports Grounds, HKU, Joint-
University Sports Ground,
Education College Sports Grounds,
Tseung Kwan O Sports Grounds ,
Sai Tsao Wan Sports Grounds, etc.

3. Zoysia Grasses: e.g. Two
Sports Grounds, The Chinese
University of Hon Kong

Seashore Paspalum: Has yet
to be used in any non-golfing
sports fields

1. 地毯草+雙耳草: 例如旺角體育場、小西灣體育場、跑馬地中場足球場,等等

2. 雜交百慕達草: 例如政府大球場、香港大學何鴻生博士運動場、聯校、教育學院、體育學院、將軍澳、晒草灣體育場,等等

3. 結縷草: 例如香港中文大學的二個體育場

4. 海濱雀稗: 尚未用於高爾夫球場外之體育場

如何評估草的品質

How to assess a turfgrass?

- **Texture**
- **Mowing Heights**
- **Hot Temperature Tolerance**
- **Cold Temperature Tolerance**
- **Drought Tolerance**
- **Traffic & Wear Tolerance**
- **Fertilizer Rates**
- **Shade Tolerance**
- **Establishment Time**
- **Insect Resistance**
- **Disease Resistance**
- **Salt Tolerance**
- 葉片之大小/粗幼
- 剪草高度
- 耐熱性
- 耐寒性
- 耐旱性
- 耐磨損性
- 對肥料的需求
- 耐陰性
- 成坪的時間
- 抗蟲性
- 抗病性
- 抗鹽性

葉片之大小/粗幼

Leaf Texture



地毯草 **Carpet Grass**

雙耳草 **Hilo Grass**

百喜草 **Bahiagrass**

聖奧斯丁草 **St. Augustine**

高羊茅 **Tall Fescues**

黑麥草 **Ryegrasses**

肯州藍草 **Ky. Bluegrass**

細葉羊茅

粘人草 **G/Spear Grass**

假儉草 **Centipede Grass**

結縷草 **Zoysiagrass**

百慕達草 **Bermuda grass**

濱海雀稗 **Sea'Paspalum**

改良百慕達草 **Imp. Bermuda**

剪股穎 **Bentgrass**

香港體育場地常用的草坪草

Common Turfgrass Used on Sports Fields In HK

1. Carpet Grass + Tilo Grass: e.g. Mok Kok Sports Grounds, Shiu Sai Wan Sports Grounds, Happy Valley Infield Sports Grounds, etc

2. Hybrid Bermudagrass: e.g. Hong Kong Stadium, Dr. Stanly Ho Sports Grounds, HKU, Joint-University Sports Ground, Education College Sports Grounds, Tseung Kwan O Sports Grounds, Sai Tsao Wan Sports Grounds, etc.

3. Zoysia Grasses: e.g. Two Sports Grounds, The Chinese University of Hon Kong

4. Seashore Paspalum: Has yet to be used in any non-golfing sports fields

- 地毯草+雙耳草: 例如旺角體育場、小西灣體育場、跑馬地中場足球場,等等
- 雜交百慕達草: 例如政府大球場、香港大學何鴻生博士運動場、聯校、教育學院、體育學院、將軍澳、晒草灣體育場,等等
- 結縷草: 例如香港中文大學的二個體育場
- 海濱雀稗: 尚未用於體育場

香港常用五種體育場地草坪草的比較 – 1

Comparison of the 5 Commonly Used Turfgrasses for Sports Field - 1

Carpet Grass (+Tilo Grass) –

Axonopus compressus (+
Paspalum conjugatum)

Hybrid Bermudagrass Tifton
419

Cynodon dactylon x *C.*
transvaalensis cv. Tifway

Korean Grass

Zoysia japonica

Manila Grass

Z. matrella

Seashore paspalum

Paspalum verginatum

- 地毯草 (+雙耳草)

Axonopus compressus +
Paspalum conjugatum

- 雜交百慕達草-天堂草 419號

Cynodon dactylon x *C.*
transvaalensis cv. Tifway

- 結縷草(朝鮮草)

Zoysia japonica

- 溝葉結縷草(馬尼拉草)

Z. matrella

- 海濱雀稗

Paspalum verginatum

地毯草 = 42/圓柱



天堂草 419 = 191/圓柱



溝葉結縷草 = 212/圓柱



結縷草 = 96/圓柱



海濱雀稗 = 247/圓柱



溝葉結縷草 = 212/圓柱



中华人民共和国国家标准 - GB/T 19995.1— 2005

天然材料体育场地使用要求及检验方法

第1 部分： 足球场地天然草面层

Technical requirements and test methods for natural material sport fields

Part 1: Grassed surface for football fields

- 5.10 根系层渗水速率
- — — 采用圆筒法合格值应为(0.4~ 1.2) mm/min，最佳值应为(0.6~ 1.0) mm/min。
- — — 采用实验室法合格值应为(1.0~ 4.2) mm/min，最佳值应为(2.5~ 3.0) mm/min。
- 同一场地应采用一种检测方法，当检测结果有分歧时以实验室检测法为准。
- 5.11 渗水层渗水速率
- 实验室法应大于3.0 mm/min。
- 5.12 有机质及营养供给
- 根系层要求应有足够的有机质及氮(N)、磷(P)、钾(K)、镁(Mg)等。
- 5.13 环境保护要求
- 不应使用胶带有危险的或是散发对人、土壤、水、空气有危害污染的物质或材料。
- 5.14 叶宽度
- 叶宽度宜不大于6mm，可根据各地区具体情况，选择合适的草种。
- 5.8 茎密度
- 单位面积内向上生长茎的数量，合格值应为(1.5~ 4)枚/cm³，最佳值应为(2~ 3)枚/cm³。

香港常用五種體育場地草坪草的比較 – 2.1

Comparison of the 5 Commonly Used Turfgrasses for Sports Field – 2.1

草種名 Grass Species	學名 Scientific Name	葉片闊度 Texture (Leaf Width)	No. of Sward/Core (Data derived from 2 Samples Only)
地毯草 Carpet Grass	<i>Axonopus Compressus</i>	十分寬闊 Very Coarse	42/86.6cm ²
天堂草 419 Tifton 419	<i>Cynodon dactylon</i> x <i>C. transvaarensis</i> – cv. 419	幼細至中等 Fine to medium	191/86.6cm ²
結縷草 Korean Grass	<i>Zoysia japonica</i>	中等 Medium	96/86.6cm ²
溝葉結縷草 Manila Grass	<i>Zoysia matrella</i>	幼細至中等 Fine to medium	212/86.6cm ²
海濱雀稗 Seashore Paspalum	<i>Paspalum varginatum</i>	幼細至中等 Fine to medium	247/86.6cm ²

耐蔭性

Shade Tolerance

Tolerant	聖奧斯丁草 St. Augustine
	細葉羊茅 Fine Fescues
	地毯草 Carpet Grass
	雙耳草 Hilo Grass
	高羊茅 Tall Fescue
	黑麥草 Ryegrasses
	剪股穎 Bentgrass
	粘人草 G/Spear Grass
	假儉草 Centipede Grass
	百喜草 Bahiagrass
	結縷草 Zoysia Grass
	濱海雀稗 Seashore Paspalum
	肯州藍草 Ky. Bluegrass
Intolerant	百慕達草 Bermuda Grass

草地的建造

Turf Establishment

1. Sexual Reproduction

a.) By seed

- 有性繁殖
- A. 草種的選擇

2. Vegetative Propagation

a.) Sodding

b.) Plugging

c.) Sprigging/Stolonization

- 無性(營養)繁殖
- A. 草皮法
- B. 草塊法
- C. “匍匐莖”法

草地擴繁的方法

Sodding vs. Sprigging - 草皮 vs. 散草

By Sodding 草皮法	By Sprigging /Stolonization 散草法
“Instant” effect - 需時較短	Takes only slightly Longer to establish - 需時略長
Not cost effective - 價錢較貴	More cost effectiveness - 價錢較平
More difficult to fine-tune the surface after planting - 種草後地面較難平整	Easier to maintain after planting – 種草後地面較為平整
Uneven Surface - 草面較不平	Evener final surface - 草面較平
Less root anchorage - 扎根較差	Better root anchorage - 扎根較好
Difficult on final adjustment on ground level - 地面平整較難	Easier adjustment on ground level. - 地面平整較易

驗證 Tifton 419草地苗圃 Certified Tifton 419 Sod Production Farm



草皮之收割 - 1

Sod Harvesting – 1



草皮之收割 – 2

Sod Harvesting - 2



草皮之收割 – 3 (洗濯)

Sod Harvesting – 3 (Washing)



草皮之收割 - 4

Sod Harvesting - 4



草皮之收割 -5

Sod Harvesting - 5



草皮之敷設 – 1

Sod Laying – 1

1995 Happy Valley Racecourse Re-Development



草皮之敷設 – 2

Sod Laying – 2

1995 Happy Valley Racecourse Re-development



草皮之敷設 – 3

Sod Laying – 3

1995 Happy Valley Racecourse Re-development



新鋪設的草皮之澆水 Watering the Newly Laid Sod

跑道可在6星期後跑馬

The Track was ready for racing in 6 weeks



草塊法

Plugging

- **Less expensive**
 - **Takes longer**
 - **Ratio of coverage: 1: 6 to 1-10, etc.**
 - **Post-planting/finishing level: Uneven**
 - **Possible contamination of foreign material (unless washed)**
- 比較便宜
 - 需時較久
 - 比率： 1:6 到 1-10 ， 等等
 - 種植後地面較不平整
 - 很可能受外物所污染 (除非已清洗)

Plugging – 1

This was how the Singapore Turf Track was established



Plugging - 2



Plugging - 3



“匍匐莖”法

Sprigging/Stolonization

- Least expensive
- Takes a little longer
- Ratio of coverage: 1: 20 or more
- Post-planting/finishing level: even
- No contamination of foreign material, e.g. soil
- Better anchorage of roots
- 最便宜
- 需時較久
- 比率： 1:20或較多
- 種植後地面較平整
- 受外物(如泥土)所污染機會較少
- 扎根較好

Certified Tifton 419 Sod Production Farm

驗證 Tifton 419草地苗圃



Tifton 419 Sprigs

Tifton 419 的散草



匍匐莖之收割 Harvesting Stolons

This was how the Sha Tin Racecourse Turf Track built from in 1976-77



將匍匐枝均勻散播泥面 Spreading the Stolons in the Field



匍匐莖之生長

扎根較好(深)

Growth of the Stolons

Better root anchorage



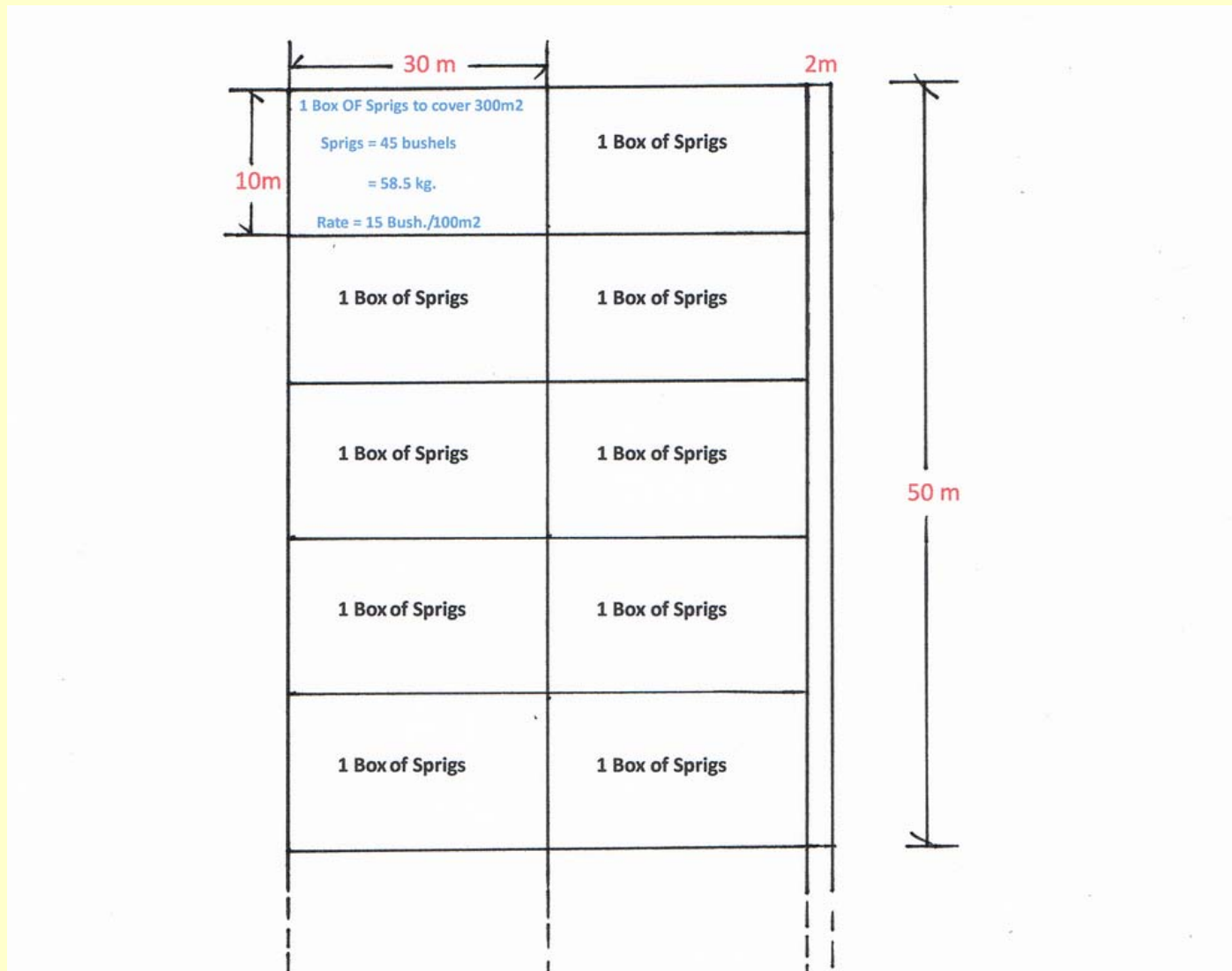
“散草”的種植

Planting of the Sprigs/Stolons

1. **Planting Rate: 8-15 Bushels/100 m²**
 - 播植率: 8-15 蒲式耳 /100 m²
2. **Even-Spreading of the sprigs manually.**
 - 用人手將匍匐枝均勻散播在地面上
3. **Pushing the Sprigs by Disc Roller**
 - 用 **Disc Roller** 將匍匐枝推入泥面
4. **Light Rolling.**
 - 鋪上一層薄沙
5. **Top-Dressing with a light layer of sand**
 - 需要時用人手將浮動匍匐枝推入泥面。
6. **Manual Insertion of Loose Sprigs when needed.**
 - 澆水
7. **Watering.**

種草時球場分區示意圖

Layout Map Showing Zoning for Sprigging



種植前的準備工作

Pre-Planting Preparation



“散草”的種植 - 1

Sprigging - 1



Sprigging - 2

“散草”的種植 - 2



Sprigging -3

“散草”的種植 - 3



Turf Pitch in the Making

草地球場的生長過程



覆蓋度測試 Coverage Check



草地(草坪)用草之管理 Turfgrass Management



草地管理的策略

Turf Management Strategy

1. **Controlled usage is the key word.**
 2. **Planning: Develop daily, weekly, monthly and yearly programs in maintaining turfgrass.**
 3. **Practice Integrated Pest Management (IPM) tactic in managing turfgrass. Build up data bank, threshold for pest control.**
 4. **Training – Proper training is always required!**
 5. **Turf management is a hand on job that direct contact with your staff and the turfgrass are needed.**
 6. **Environmentally awareness.**
- 控制使用是最大關鍵
 - 計劃: 開發每日、每週、每月和每年程式在維護草坪草
 - 實踐中管理草坪草綜合害蟲管理 (IPM) 策略。建立資料銀行、蟲害控制的閾值
 - 培訓 —— 適當培訓永遠是需要的
 - 草坪管理是一隻手在作業需要與您的員工和草坪草的直接接觸
 - 無害環境的認識

工作程序

Management Program

- ANNUAL PROGRAM:

1. Two rest periods.

- a. Early May – For any major maintenance works.

- b. Early November – For repairing & over-seeding works.

2. **Controlled Usage**

- MONTHLY/WEEKLY PROGRAM:

1. One (1) rest day per week.

2. Carry out cultural practice when needed.

- DAILY PROGRAM:

1. Watering when needed.

2. Minor repairing after use.

- 每年的工作計劃

1. 二個休息期

- a. 五月上旬 - 作主要維修工作 用

- b. 十一月上旬 - 作維修工作用及蓋種用

2. **控制使用率**

- 每月/周的工作計劃.

1. 每周一休息日

2. 執行所需工作.

- 每日的工作計劃

1. 需要時澆水.

2. 執行一般養護工作.

每月之工作計劃/記錄表

Monthly Planning/Record Chart

Monthly Maintenance Program and Record Chart

JUNE OS	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Week 1	1 Mowing	2 Sodding	3	4	5	6	7
Week 2	8 Mowing	9	10	11	12 Fertilization	13	14
Week 3	15 Mowing	16 Worm	17	18	19	20	21
Week 4	22 Mowing	23	24	25	26	27	28
Week 5	29 Mowing	30					
Remarks							

球場所採用的草

Turfgrasses Used in this Pitch

- Summer Grass:
Hybrid
Bermudagrass -
Tifton 419 (Tifway).

Winter Grass: Added in
around early November

Perennial Ryegrass

Why?

- 夏天主要用草:
改良百慕達草
- 冬天主要用草:在每年11
月左右加(蓋)種: 黑麥草

原因?

一般的修葺

Minor Repairing

- Tidying up the surface of the disturbed patches – Leveling & removing dead grass fragments
- Adding a thin layer of sand
- Promoting recovery
- 修補受損部分 - 平整及將死草移走
- 加以一層薄沙
- 可增促恢復

一般的修葺

Minor Repairing



剪草

Mowing

Mow regularly, more or less once a week.

Use proper mowing equipment.

Mowing height dictated by type of grass and season.

Don't cut more than 1/3 of the height of grass at any given time.

Collect the chippings after mowing.

- 定期剪草, 每星期至少一次.
- 使用適當的剪草機.
- 根據草的品種及季節而決定剪草的高度. 每次剪草應不超過總高度的三分之一.
- 每次剪草後回收所有的草碎.

剪草 Mowing



Grass Left Too Long Before Mowing - Scalping

草留得太長才剪 - 禿頂



草碎回收

Chipping Collection

- **Covering the grass below**
 - **Creating yellowish patches**
 - **Decomposing and creating heat**
 - **Increasing organic matter & thatch layer**
 - **Hosting pests**
- 遮蓋着下面的草
 - 移去後留下黃斑塊
 - 腐敗時產生熱
 - 增加有機物及令死草層增厚
 - 增加衍生病蟲害機會

草碎回收 Chipping Collection



澆水

Watering

1. Even coverage.
 2. Equivalent to ca. 4 mm of rain/day.
 3. Use automatic sprinkler heads for sports fields.
 4. Supplementary system need.
- 均勻覆蓋.
 - 每天澆水約澆相當於4mm 的雨水.
 - 用自動噴水頭噴水.
 - 需要有輔助澆水系統

澆水 Watering



施肥

Fertilizing

- **Using compound fertilizer + essential and trace elements.**
- **Ratio N:P:K = 1:1:2**
- **Apply more K in Autumn**
- **Even spreading**
- **Adequate watering**
- **Try folia fertilizers**
- 使用複合肥 + 基本元素和微量元素
- 氮:磷:鉀的比例為 1:1:2 或更多的鉀
- 在秋季時追一次鉀肥
- 均勻散播
- 充足澆水
- 可試用葉面肥

施肥 Fertilizing



疏氣 Aeration

- **Slicing**
- **Spiking**
- **Coring**
- 切鏟
- 實心(針)打洞
- 空心(針)打洞

疏氣－實心針及空心針打洞Aerating－ Spiking/Coring Solid tine vs. hollow tine



鋪沙(“皮泥”) Top-Dressing

- **Stop watering & dry up the surface first**
 - **Use quality sand only**
 - **No more than 5 mm thick of sand**
 - **Best done after coring and after removal of the loose plugs**
 - **Use drag-mat to drag the sand in**
- 先停止澆水令地面乾燥
 - 使用良好品質的沙；每次不超過 5 毫米厚為準
 - 最好在完成打洞後及小泥柱移走後才鋪沙
 - 使用拖網拖平表面及將沙拖入小洞內

覆土(“皮沙”) Top-Dressing



垂直切割

Verti-cutting - Dethatching

- Removing thatch: organic matter & dead/live plant parts
- Encouraging lateral growth – thickening of the turf layer
- Stop watering prior to verti-cutting (dethatching).
- Cut in no more than 30 mm.
- Remove all the debris
- Stolon recovered from verti-cutting can be used for propagation (stolonization)
- If needed follow by light top-dressing (1mm)
- 移走死草層:有機物,死/生植物部分
- 促進橫向生長 -有助草皮增厚
- 垂直切割前(**dethatching**)停止澆水
- 垂直切割深度應不超過 30 mm
- 將所有死草層物質及草莖等移除
- 從垂直切割移除出的匍匐莖碎片可以用於繁殖用 (**stolonization**)
- 如有需要可鋪以一層薄 (1 毫米)

垂直切割 Verti-cutting



滾壓

Rolling

- **Make the surface more flat**
- **Make closer contact of the newly laid turf/sprig with the “soil” surface for better rooting**
- 令地面更加平整
- 令新種草皮或匍匐莖與地面接觸更緊密，更易生根

滾壓 Rolling



(冬日)蓋種 Over-seeding

- **Aesthetic – Better Winter colour**
 - **Increase turf density**
 - **Die-back of the winter grass from April onwards**
 - **Spring recovery of the warm-season grass**
- 美觀 - 冬天草的顏色
 - 增加草的密度
 - 冬草會在 4 月後開始死亡
 - 夏草會在春天後開始回復

(冬日)蓋種 Over-seeding



泥面真菌及藻類增生

Fungal & Algal Growth on Surface

- **Inundated water on the surface**
 - **Highly compacted rootzone surface**
 - **Poor drainage**
 - **Excessive fertilizer**
 - **High air moisture**
 - **Continued rain**
 - **Shaded**
- 泥面積水
 - 泥面板結
 - 疏水率低
 - 多量肥料
 - 空氣溼度高
 - 長期下雨
 - 蔭蔽

泥面真菌及藻類增生 Fungal & Algal Growth on Surface



病,蟲,雜草之控制

Pest Control

1. “Insect” Pest Control

2. Disease Control

3. Weed Control

- “蟲” 害控制
- 病害控制
- 雜草控制

病蟲害之整合諧調管理

Integrated Pest Management (IPM)



“蟲” 害及其控制

“Insect” Pest and its Control

1. Above-Ground Pest

- a. Worms: Cutworms
Armyworms,
Webworms, etc.
- b. Leaf Hopper, aphid,
mite, etc.
- c. scales, spiders, etc.

2. Under-Ground Pest

- a. White Grubs
- b. Billbugs
- c. Nematodes

Control by Application of Insecticide

- 地面蟲害

- a. 青蟲: 黏蟲, 行軍蟲,
吊絲蟲, 等
- b. 葉蟬, 蚜蟲, 蟥, 等
- c. 介殼蟲, 蜘蛛, 等

- 地下蟲害

- a. 蟮蟻
- b. 象甲蟲
- c. 線蟲

可用殺蟲劑控制

青蟲

Cutworms/Armyworms



百慕達蟎

Bermuda Mite



介殼蟲 Scales



葉蟬

Leaf Hopper



蚜蟲 Aphids



螻蛄(土狗) Mole Crickets



蠋蟥

Beetles - Grubs

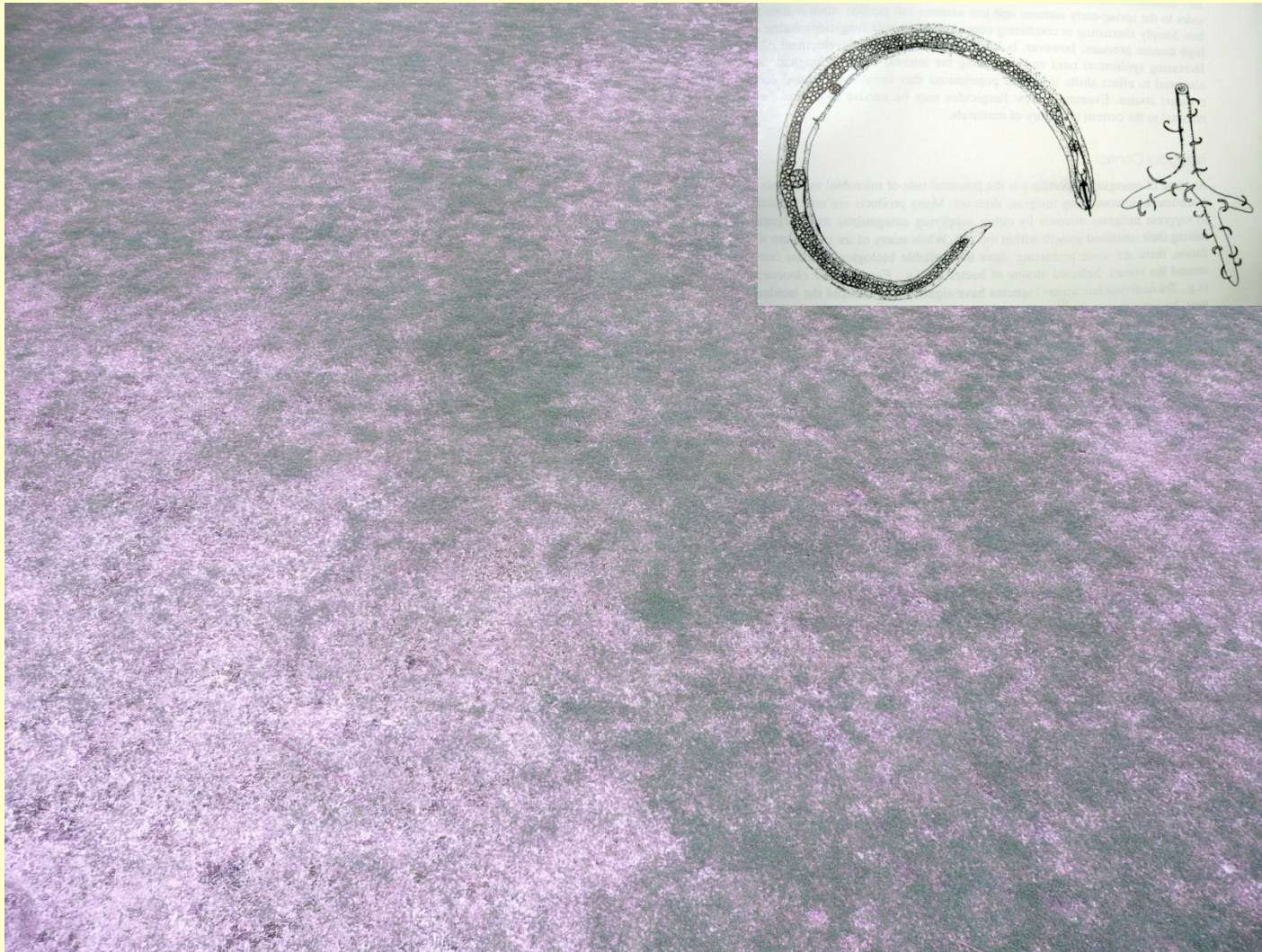


象甲蟲 Billbugs



線蟲

Nematodes



病害及其控制

Disease and its Control

- Cultural Practice
 - a. Improving drainage
 - b. Reduce moisture
 - c. Improve ventilation
 - d. Control fertilizing
 - e. Use resistant strain
 - Application of fungicide
- 加強護養
 - a. 改善排水
 - b. 減低濕度水分
 - c. 改善通風
 - d. 控制施肥
 - e. 使用抗性的品系
 - 使用殺菌劑

疾病 Diseases

Pathogen

1. Fungus
2. Bacterium
3. Virus
4. Others

病原體

1. 真菌
2. 細菌
3. 病毒
4. 其他

疾病 - Diseases

1. Mushroom – Fairy Ring
2. Pythium
3. Brown Patch
4. Dollar Spot
5. Leaf Spot
6. Powdery Mildew
7. Rust, etc.

1. Prevention is always better than curing
2. Control by cultural practice & application of Fungicide

1. 蘑菇 – 仙人環
2. 腐霉病
3. 褐斑病
4. 幣斑病
5. 葉斑病
6. 白粉病
7. 銹病

1. 預防勝於治療
2. 改良生長環境再輔以使用適當的殺菌劑控制

蘑菇 Mushroom

疾病? Disease ?



褐斑病

Brown Patch



銹病

Rust



腐霉病 Pythium



葉斑病

Leaf Spot



白粉病

Powdery Mildew



雜草之控制 - 1

Weed Control - 1

Type of Weed:

1. **Broad-Leaves Weed (Dicotyledonous-Weeds)**
2. **Grassy weeds (Annual & Perennial)**
3. **Sedges weeds**

雜草之型類：

1. 闊葉雜草 (双子葉雜草)
1. 草類雜草
(一年生及多年生雜草)
3. 莎草

雜草之控制 - 2

Weed Control - 2

Weeding Method:

1. Manual Weeding
2. Chemical weeding
 - a. Non-selective & Selective.
 - b. Systemic & contact.
 - c. Pre-emergence & Post-emergence

除草方法:

1. 人工除草
2. 化學除草
 - a. 非選擇性 及選擇性
 - b. 內吸性及接觸性
 - c. 芽前及芽後

人工除草

Manual Weeding



化學除草

Chemical Weeding



莎草 Sedges



用化學除草劑控制莎草

Sedge killed by selective weed-killer



闊葉雜草和草類雜草

Broad-Leaf & Grass Weeds



修補 Repairing

- Outsourcing from reputable supplier
 - Use certified material only
 - Use washed sod or nursery using the same grade of sand for sod production
 - Set up your own “nursery”
- 向信譽好的供應商購買
 - 使用認證的材料
 - 使用水洗後的草皮或指令苗圃使用同一類型的沙種草
 - 設置自己的“苗圃”

建立您自己的草苗圃

Build up your own nursery



一般修補工作 Minor Repairing



成功種草的秘訣

Secret for Success

1. **Doing 100% is not enough as we need to do it 110%**
2. **30% for establishment, 70% for maintenance plus 10% of your heart: an open heart (mind), a devoted heart and a passionate heart**
3. **Human effort can achieve anything**

1. **100分尚不够,要做到 110分**
2. **三分種植,七分護養,再加一分的心: 心是指虛心,投入的心及愛心**
3. **事在人為!**

晒草灣運動場

Sai Tsao Wan Sports Ground



一個成功的群隊

The Successive Working Team



如果他們能,那您也可以做得到
If they can, you can do it too!

- **If you carry out those works rigidly and with passion you can make natural turf pitch working, just like those guys in Sai Tsao Wan!**
- 如果您能嚴格及激情地實施上述的各種工作程序,您便可以使天然草地場成功,就像那些在晒草灣那些人一樣!

結論

Conclusion

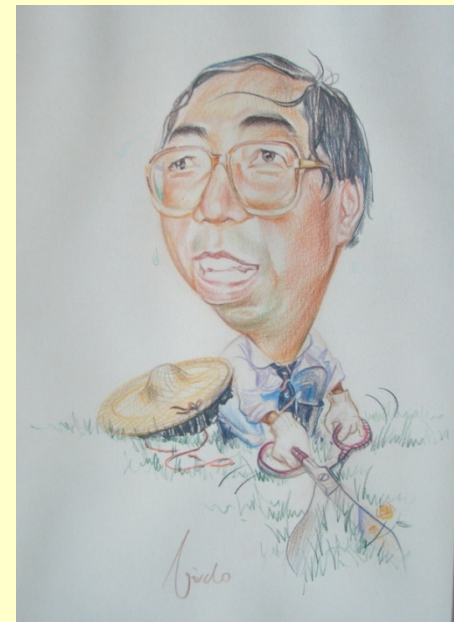
1. **Turf management is a combination of science and application**
2. **Professional training is needed especially for the person in charge of the turf facility**
3. **Also need mid-management persons & a good mechanic**
4. **Build up sense of belonging & satisfaction for your staff**
5. **Full commitment is required - your heart and your passion**

Hong Kong's natural turf Sports Field got a future provided that the field is managed by competent and devoted staff!

1. 草地管理需要科學與實踐的結合
2. 管理人員需要專業的訓練
3. 亦需要良好的中層管理人才及機械師
4. 培養在職員工之歸屬感及滿足感
5. 從業人員需要全情投入

香港草地運動場地的前景是肯定的:只要場地是由能幹及熱誠的員工管理

謝謝各位
Thank You
<END>



問題及解答

Q & A



Website

[WWW.ihs.org.hk](http://www.ihs.org.hk)