Module # 2 – Component # 4

Bush Encroachment and Control

Objective

Understand the threat that bush encroachment represents and to be able to recommend and implement effective control measures

Expected Outcome

- Define and recognise bush encroachment
- Select an appropriate method for control
- Understand the principles of fire management
- Predict the impact of fire on grassland and savanna
- Gain an introduction to water provisioning
Introduction

Bush encroachment takes place when woody plant species invade an area, usually due to natural or artificial disturbances in the ecosystem.

The following factors are considered to play an important role in bush encroachment:

- Incorrect grazing practices
- Weakening of the grass stratum by drought or human disturbances
- Incorrect fire management practices
- Absence of game migrations
- Absence of browsers
- Absence of factors which cause tree damage
- Presence of insect plagues

Bush encroachment leads to a decrease of the grass cover and grass production per hectare, and consequently the grazing capacity. It has been found that bush encroachment can decrease the annual grass production by 40 – 90%. The reduced grass cover may lead to soil erosion.

There are several ways of controlling bush encroachment. These can be divided into chemical, mechanical and biological methods.
Biological Methods

- **Fire**: This can be effective provided there is enough grass cover to sustain fire at a high enough temperature.

- **Browsers**: Provided the types of browse and height is acceptable to the browsers introduced

- **Insects**: For example, cochenille (Dactylopius australis) and cactoblastis (Cactoblastis cactorum) have been successfully used against **prickly pears** (Opuntia spp.) and **jointed cactus** (Opuntia aurantiaca). Beetles and wasps have also been used against **Hakea sericea** and **Acacia longifolia** respectively.
Chemical Methods

When using commercial chemicals to control bush encroachment it is important that the chemicals are selective to the problem species and do not damage the desirable bush species which grow alongside it. In cases where fire or browser control is not possible, chemical treatment is recommended.

Various chemicals are available on the market and are applied in different ways. Chemicals can be applied to the leaves of the plant, the stem, the stump after cutting, or to the soil at the base of the trunk.
Mechanical Methods

- **Ring-barking:** Removing the bark of the tree around the trunk, causing the tree to die within one to three years.

- **Repeated defoliation:** By using an axe, brush-cutter or chainsaw the branches of the tree are repeatedly felled.

- **Excavation:** By means of a bulldozer. This is a costly option and causes great soil disturbance.

Soil under trees is more fertile and is also richer in nitrogen, phosphate and calcium than soil in open spaces between trees. Some grass species such as *Panicum maximum*, which are high in nutritional value, often occur under trees.

When complete removal of trees takes place in an area, it often happens that the grazing improves in the short-term, but the veld condition deteriorates over time since the plant composition changes because of lower soil fertility. It is therefore important that bush clearing be done selectively, as thinning of the bush yields better long-term results than total eradication of trees.
Fire Management

Fire has been a natural component of the ecosystems of southern and central Africa for thousands of years and the vegetation has adapted to the effects of fire. In some ecosystems, fire has become essential to proper system functioning e.g. the Fynbos biome of the Western Cape. The controlled application of fire as a management tool is an important part of the management decisions in a wildlife area.

Fire must not be withheld indefinitely, but neither must excessive burning be permitted. In recent years, perceptions of fire management in nature reserves, and in particular; savanna areas, have changed from the classic fixed block burning with a fixed return period to a more flexible randomized fire pattern. This shift in emphasis is aimed at maintaining the high patch diversity of savanna ecosystems. This type of fire mosaic can be achieved by random spot ignition of fires by management, after which the fire is left to itself, lightning fires, and leaving non-management fires caused by other factors to itself. This approach is generally more suited to extensive areas.

In habitat management fires are used for the following purposes:

- To remove dead plant material
- To control the encroachment of undesirable bushes and trees
- Force trees to coppice, and thereby lower the canopy into the reach of browsing animals
- Remove potentially dangerous fuel loads, and reduce the subsequent impact of wild fires
- Encourage rotational grazing

Burning is unacceptable if it is to be used to stimulate a green flush of grazing out of season. The combined effects of overgrazing, increased water run-off, increased soil erosion and decreased vigour of the grass sward lead to widespread and drastic deterioration of the vegetation.
Impact of Fire on Grassland and Savanna

**Most palatable grass** species are adapted to moderate utilization, such as by fire or grazing. These grasses become choked by dead plant material and lose their vigour when they are not defoliated over an extended period. Excessive defoliation, on the other hand, depletes the storage reserves of palatable grass species. **Shortly after a fire the grass will produce a green flush.** This requires the grass plant to draw nutrients and energy from its storage organs.

When a grass plant is repeatedly burnt without having an opportunity to recover, or is grazed excessively shortly after burning, the plant is weakened, and **deterioration of the grazing capacity** often occurs. The green flush that is produced on the burnt area must exceed the forage requirements of the game that is attracted to it, to protect the area of new growth. To achieve this, the area that is burnt must be sufficiently large, or several areas must be burnt simultaneously.

**The frequency of burning** depends on the **production rate of the grass**, which in turn is related to rainfall, and the degree and proportion to which the veld is utilized. The frequency may vary from annually on unutilised sour veld, to every three or four years on mixed veld, to even longer or not at all on sweet veld. The **frequency of burning in savanna will be determined by the condition of the veld**, the rate at which shrubs grow beyond the reach of browsers, bush encroachment and the rate at which unutilised grass material accumulates.

In determining the best **time for fire** use, it must be noted that actively growing plants are more susceptible to damage by fire than dormant plants are. The management aim of the fire should be taken into consideration.

- **When a scorching effect** on the trees and bushes is desired to reduce woody density, a fire should be applied when the woody vegetation is actively growing.

- **When a fire is needed to remove unutilised build-up of grass material**, a fire should be applied when these plants are dormant, in late winter before the expected onset of the spring rains.

Fires which are applied early in the summer, when the grass is growing actively, have a disastrous effect on the productivity, basal cover and species composition of the grassland.
The following factors influence the intensity of the fire:

- Fuel load
- Fuel moisture
- Air humidity
- Temperature
- Wind speed

**Fires applied at midday**, burn hotter than fires applied early in the morning when some dew is present, the ambient temperature is lower, and the relative humidity of the air is higher.

**Headfires** are fires that burn with the direction of the wind, these fires are also frequently referred to as **Cool Burns**. **Back fires burn against the wind direction** and are known as **Hot Burns**. Headfires burn at a higher temperature than backfires, but with the point of highest heat intensity situated between 1 and 3 metres above the ground. The heat intensity for backfires is situated much closer to the ground.

**For woody vegetation**, a head fire is necessary. To ensure a fire of high enough intensity, the following conditions should prevail:

- Fuel load of more than 4,000kg (8818 lbs.) per hectare
- Ambient temperature of 25°C (77 °F) or more
- Relative air humidity of 30% or less
- Wind speed less than 20km per hour (12 ½ mph)

**These conditions generally prevail between 11h00 and 15h00.**

The development of a **firebreak system** is essential in most grassveld areas. Any burning operation should start along such a firebreak as a backfire / back-burn. Once this firebreak has been burnt for a **sufficient distance to ensure safety** (so that the fire begun on the opposite side of the block to burn, cannot either jump a road border or onto an adjacent block), a **fire is then started on the upwind side**, so that a head fire burns the greater portion of the area.

The new growth after a fire has a **higher protein and mineral quality** in the spring than unburnt grassland, but the total dry material yield is reduced for the first season after the fire. This generally returns to normal in the second season after the fire.
Water Supply

It is important that the location of waterholes be planned with great care, taking into consideration the topography, geohydrology, plant communities, soil types and the movements and drinking habits of different types of game. The availability of water has a pronounced effect on the distribution and movement of game.

The distribution and seasonal availability of water therefore also has a major influence on the degree to which the vegetation is utilized, and the incorrect placement of waterholes is a prominent cause of local over- and underutilization. It is important that artificial waterholes are controllable. Rotational grazing can also be encouraged by closing the waterholes in overutilized areas.

Impala: Aepyceros melampus
Wise Water Management

Water is an absolute necessity. At Hillcrest Game Estates arrangements must be made to ensure that all animals are never without non-contaminated water. The farm gets its water from two borehole sources. To prevent sicknesses, three large 10 000-liter water tanks are cleaned each week. Water leakages are prevented by checking all pipelines and water trough ball-valves. This check is conducted on a daily basis.

At first, solar-power generation is used for water extraction and pumping to the central reservoir. Thereafter, gravity-feed is used for distribution to all camps from the central reservoir. These three water tanks (30 000 litres in total) provide sufficient water to 15 camps. Each camp is approximately 50 hectares in size and contains three water troughs. Parasite build-up is prevented by regular rotation of these water troughs.

In the case of veld-fire emergencies, firefighters will make use of water from these tanks.

Seen here, farm foreman Bennie Groenewald inspects the water tanks.
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