Queensland
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DEPARTMENT OF PRIMARY INDUSTRIES

Doone (left) and Ticia Wildin in a crop of Highworth lablab at the Brigalow Research Station, near Theodore. The crop is near the end of flowering (mid May 1974).

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Contents

New strawberry variety

A new, higher-yielding strawberry variety, called Earlisweet, will be released by the Queensland Department of Primary Industries next March.

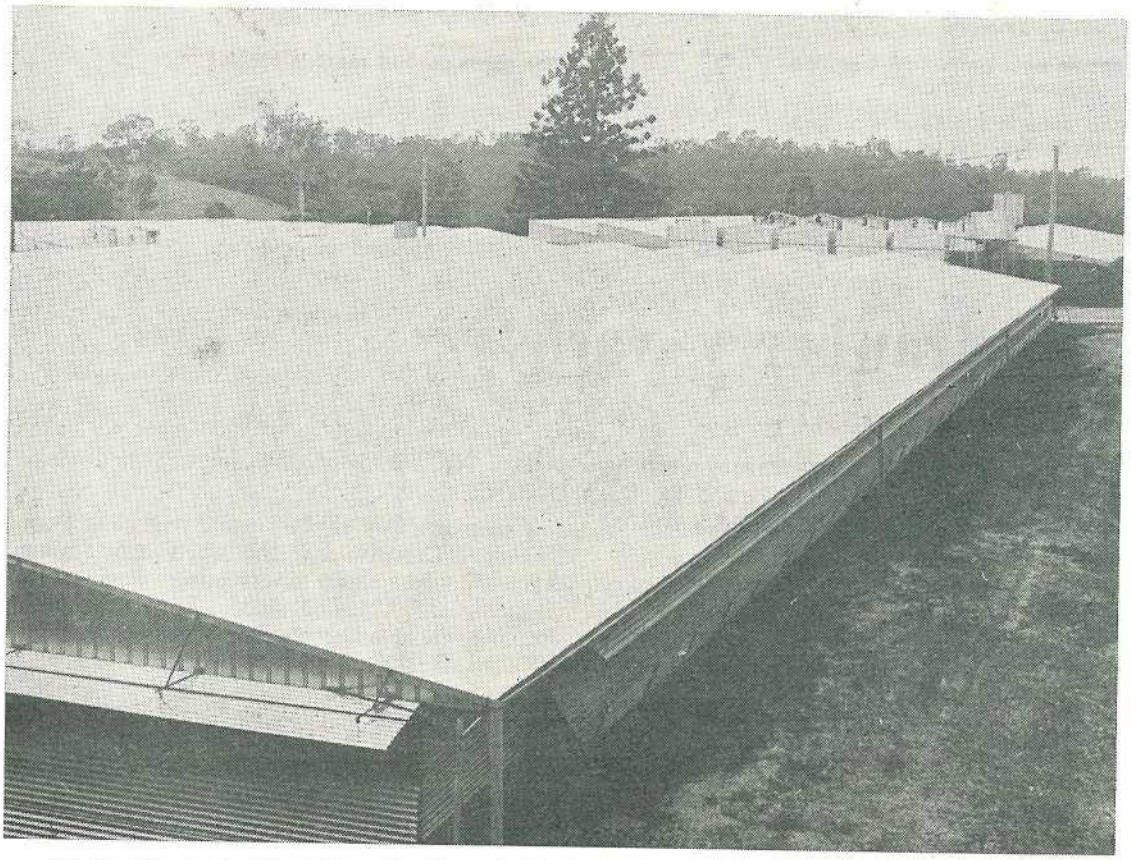
Announcing this, the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.) said one of its biggest advantages over Redlands Crimson was that it produced higher yields for both the early crop in June and July and for the whole crop from June to October. The crop also was more evenly distributed over the season.

'Earlisweet was developed at my Department's Redlands Horticultural Research Station at Ormiston,' Mr. Sullivan said. 'It has sweeter fruit, especially in the early crop, than Redlands Crimson and a more uniform colour. The fruit is mid red rather than a dark red, but is slightly smaller than Redlands Crimson.'

The plant was slightly more vigorous than Redlands Crimson but the open plant habit that allowed easier harvesting had been retained, the Minister said. Earlisweet was similar in most other plant and fruit characteristics to Redlands Crimson, except that its leaves were slightly larger and a paler green. It was developed in 1969 by Mr. I. A. Bonner, Plant Breeder at the Research Station, from a cross between Redlands Crimson and Tioga, a Californian-bred variety.

Mr. Sullivan added that arrangements were being made to provide interested growers with nucelus quantities of runners to enable them to make a commercial assessment of the new variety.

Save your hens in the next



Painting the roof with white, reflective paint is desirable to reduce the amount of radiant heat entering the shed.

heat-wave

M. EVANS, Poultry Husbandry Officer.

THE heavy poultry losses that occurred from heat stress around Christmas 1972 brought home to farmers the need to take precautions to protect their flocks in heat-waves.

A severe heat-wave can be expected in Brisbane once in every 5 years.

Heat regulation

The fowl has the ability to regulate its rate of heat production and heat loss. In this way, it maintains a relatively constant deep body temperature over a wide range of environmental conditions. To keep a constant deep body temperature requires that heat production of the bird equals the heat lost.

Under normal conditions, the temperature of the bird is above that of its environment, and consequently heat is being lost to the environment.

Heat is lost in two forms—

1. Sensible heat or direct heat.
2. Insensible heat or evaporative or latent heat.

Sensible heat

Sensible heat is lost from the bird in the form of radiation, convection and conduction. Under normal conditions, convection is the most important method of losing heat directly from the surface of the bird and accounts for most of the total heat loss. Radiation is also responsible for a significant amount of the total heat loss, but conduction is relatively unimportant. This is because, under most environmental conditions, the feet are the only part of the body in direct contact with the ground and conductive heat loss to the air is negligible because of the low thermal conductivity of air.

The rate at which heat is lost as sensible heat depends upon these factors—

THE TEMPERATURE GRADIENT between the bird and the environment is the most important. As the environmental temperature approaches that of the bird, the sensible heat flow declines to zero.

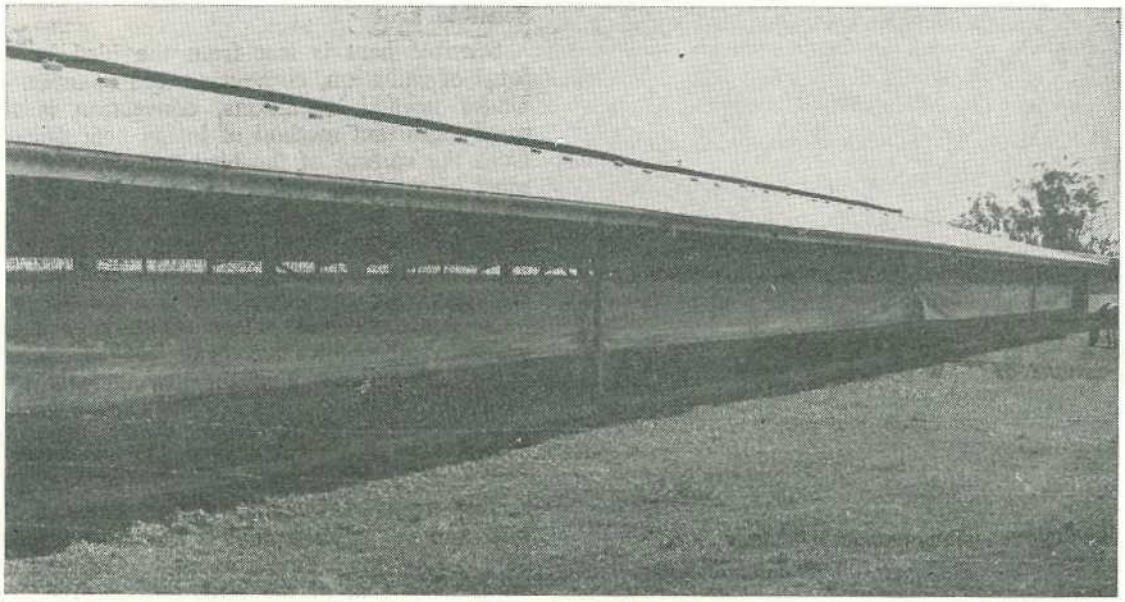
THERMAL INSULATION is another important factor and plumage has been shown to be an effective barrier against heat loss by convection.

WIND SPEED. Sensible heat loss increases as wind speed increases since there is a rise in the convection heat loss from the bird. This allows the bird to tolerate higher surrounding temperatures. However, for some unknown reason, overall heat loss is reduced once the wind speed exceeds 150 metres per minute.

POSTURAL CHANGES AND SURFACE AREA. The individual bird is able to adjust its effective surface (that is, the surface exposed directly to the environment) by postural changes. Therefore, under conditions of increasing environmental temperature, the amount of heat lost by radiation and convection from the body decreases unless the bird alters its posture. Common postural changes observed are—

- Resting position, sitting, head under wing.
- Resting position, sitting, head up.
- Standing.
- Standing, wings dropped.
- Standing, neck outstretched, wings open.

BIRD DENSITY. With one bird in a uniform



Grassing areas around sheds reduces the amount of radiant heat reflected into sheds.

environment, the heat losses from like surfaces will be the same. However, when several birds are standing together, the heat loss from like surfaces will not be the same. As the birds are crowded together, the effective surface area is reduced and the thermal characteristics of the immediate area change considerably. The thermal gradient between the bird and its immediate surroundings is reduced and this results in a decrease in the amount of heat lost.

Insensible heat

Evaporation heat loss becomes important as the environmental temperature rises towards that of the bird itself. Loss of heat by this method does not result in a change in the environmental temperature because the heat lost is used up during the process of evaporation that occurs when the birds begin to pant.

Evaporative heat loss is especially valuable as a method of dissipating heat when the air being breathed is relatively dry, but its efficiency is determined by the relative humidity of the surrounding air.

It has been shown that, at an environmental temperature of 34°C and a relative humidity of 40%, the adult hen dissipated 80% of the total heat loss by evaporative means. This was reduced to 39% on increasing the relative humidity to 90% and the bird became heat stressed.

The diagram on page 458 illustrates the relationship between sensible heat and insensible heat and the environmental temperature.

Tolerance and acclimatization

Past experience of severe climatic conditions improves the bird's ability to tolerate similar conditions later on.

TOLERANCE TO HEAT. Tolerance to any given environmental temperature is greatly influenced by the local humidity and, to a certain extent, by the wind speed. The efficiency by which the bird dissipates heat by insensible means, that is, panting, is greatly influenced by the relative humidity of the surrounding air.

The fowl is able to tolerate high temperatures if there is reasonable air movement because this increases heat loss. Other factors

that govern whether a bird is able to tolerate heat are—

Breed. Tolerance to a given set of conditions is influenced by the breed. Light breeds are more tolerant than heavier ones.

Sex. Within a particular breed, the males are more tolerant than females, and non-laying hens are more tolerant than laying hens perhaps because of enhanced ability to pant.

It has been suggested that this sex difference may be a result of a larger surface area of naked skin of the combs and wattles of the males for the dissipation of sensible heat.

Nutrition. The level of nutrition greatly affects the tolerance to heat. Tolerance is less as the energy content of the diet rises. For a given calorie and protein content, increasing the proportion of fat in the diet significantly reduces the heat tolerance of the bird.

Variation within families. Birds can be selected for heat tolerance, and it has been shown that birds selected for heat tolerance can dissipate significantly more sensible and evaporative heat than unselected birds.

After acclimatization. Tolerance of birds to extreme environmental conditions increases following acclimatization. It has been shown that as the birds became used to the stress, the effects were reduced.

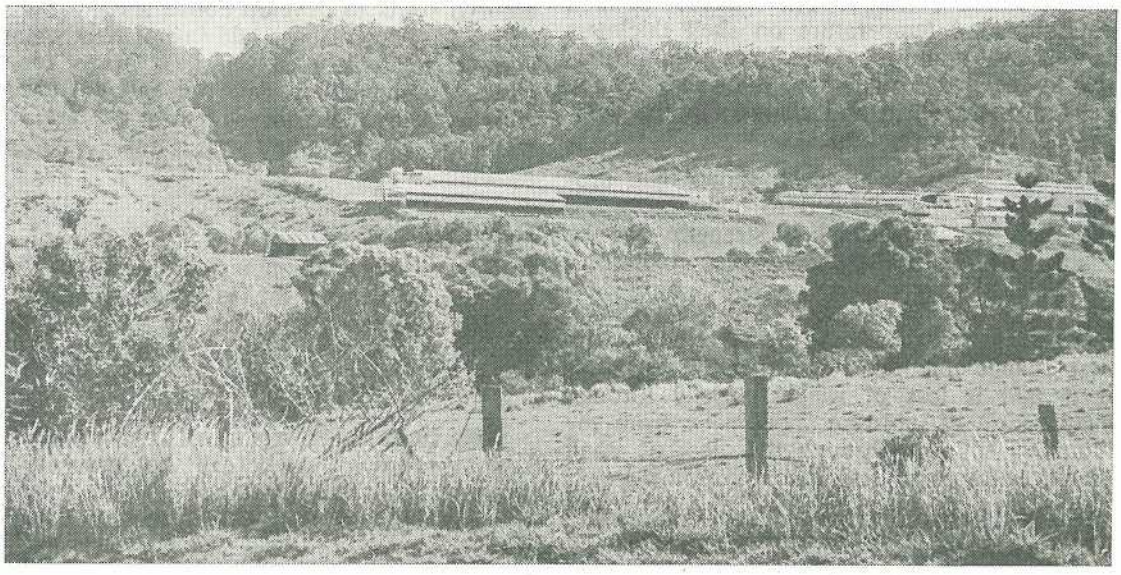
Acclimatization. Acclimatization procedure usually takes one of two forms: either the bird is reared continuously in a hot environment; or it is exposed repeatedly for short periods to such an environment and then returned to its normal one.

Both techniques have been used successfully with chickens.

Economic factors

Economic factors affected by heat stress include—

FEED INTAKE. The reduction in food intake which occurs as temperatures are raised is thought to be an energy-regulating mechanism. The requirements for nutrients other than energy-yielding components remain fairly constant in absolute amounts irrespective of the level of food intake. Thus, if food consumption is low, higher concentrations of protein (including amino acids), vitamins, and minerals are more necessary than when food consumption is high.



Elevated sites have been shown to have better air movement than those in low-lying areas.

Raising the surrounding temperature causes a reduction in voluntary food intake which, in turn, may result in a specific or general dietary deficiency.

It has also been shown that inadequacies in diet can cause extra heat production in the bird's body and hence accentuates problems of heat stress.

EGG PRODUCTION AND BODY-WEIGHT. The reduction in egg production and body-weight of birds under the influence of high temperatures has been shown to be the result of reduced food consumption. This, in turn, reduces the intake of essential nutrients unless it is compensated for in formulating the ration.

WATER INTAKE. It has been shown that, as the temperature is increased, water intake also is increased. A rise in temperature from 24° to 32°C doubles the water intake.

The increase in water intake is accounted for by the fact that water is being lost from the bird as a result of evaporative cooling (panting) and this must be replenished to prevent dehydration. It should also be noted that, as the relative humidity is increased, the amount of moisture lost by the bird is decreased and hence the amount of water required to replenish the loss is not as great.

EGG-SHELL QUALITY. The influence of high environmental temperature on shell thickness is well known and the decline has been attributed to reduced feed intake, influences on the calcium metabolism and changes in the acid-base balance of the bird.

Recent evidence, however, shows that, provided the diet is adjusted to compensate for reduced feed intake, shell strength can be maintained under high temperature conditions.

EGG QUALITY. Deterioration of egg quality starts from the moment the egg is laid. The first change that takes place in the egg after it is laid is loss of weight, chiefly through evaporation of moisture, principally from the albumin, but also through the loss of small quantities of gases such as carbon dioxide.

Temperature hastens the rate of quality deterioration and weight loss most profoundly and its effect is noticeable even as a seasonal change.

Frequent egg collection avoids excessive deterioration in egg quality.

Thus, under conditions where the temperature is high, it is extremely important to collect eggs frequently to avoid excessive weight loss, and internal quality deterioration.

FERTILE EGGS. It has been shown that the embryo starts to develop above a temperature of 20°C. Thus, if eggs laid in hot weather are allowed to remain in the nest boxes for a while, pre-incubation development will occur. This weakens the embryos before the eggs are received at the hatchery, thus reducing hatchability.

Reducing heat stress

The interior environment of a poultry shed receives heat from the external environment through the walls and roof of the shed, and also from the birds themselves, the litter and the faeces within the shed.

Heat from the environment. The amount of heat entering a shed can be reduced in several ways. These include—

1. Insulation.
2. Painting the roof with a white, durable, reflective paint.

3. Reducing the amount of bare ground around the shed.
4. Spraying the outer part of the roof and walls with water.

INSULATION. Insulation is used to minimize the gain of heat through the skin of the poultry house and results in the inside wall and roof surface that is exposed to the birds being cooler.

Insulating materials are of two types—

Reflective insulants. This type of insulating material reflects radiant heat, particularly from hot roofing. An example is aluminium foil combined with an air space. The insulating effect is the result of the high reflectivity of the aluminium foil combined with its poor heat radiation characteristics.

This property prevents the downward transfer of heat by radiation which is normally the way most heat moves downwards from roofs. The layer of air between the steel roofing and the aluminium foil allows the top surface of the foil to act as a heat reflector, bouncing back to a significant extent that heat which is radiated downwards from the under-surface of the steel roofing.

Bulk insulants. Insulating materials of this type slow down or resist the passage of heat through their substance by conduction. The insulant is really the gas, with low conductive capacity, which is trapped in very small spaces or bubbles in the material.

Whatever insulating material is used, it is extremely important that it is able to withstand washing. If not, it must be protected by an outer coating that can. Examples are mineral wool/foil combination; polystyrene protected by sheet metal; and polyurethane.

PAINTING THE ROOF. Painting the roof with a white, durable, reflective paint is desirable to reduce the amount of radiant heat entering the shed.

This radiant heat, which is reflected, would otherwise be emitted by the underside of the hot roofing, and be absorbed by the birds, in this way increasing the heat stress.

It has been shown that white painted galvanized iron roofing can be up to 28°C cooler than unpainted roofing which can reach temperatures as high as 70°C during the hottest part of the day.

Some of the heaviest losses recorded during the 1972 Christmas heat-wave were in sheds with unpainted galvanized roofs.

A relatively cheap lime wash roof paint can be made up to the following formula:—

hydrated lime	9 kg
polyvinyl acetate (P.V.A.)	1 litre
water	19 litres

This mixture covers about 65 square metres and will last 2 to 3 years. It is unsuitable for rusted galvanized iron or aluminium roofing.

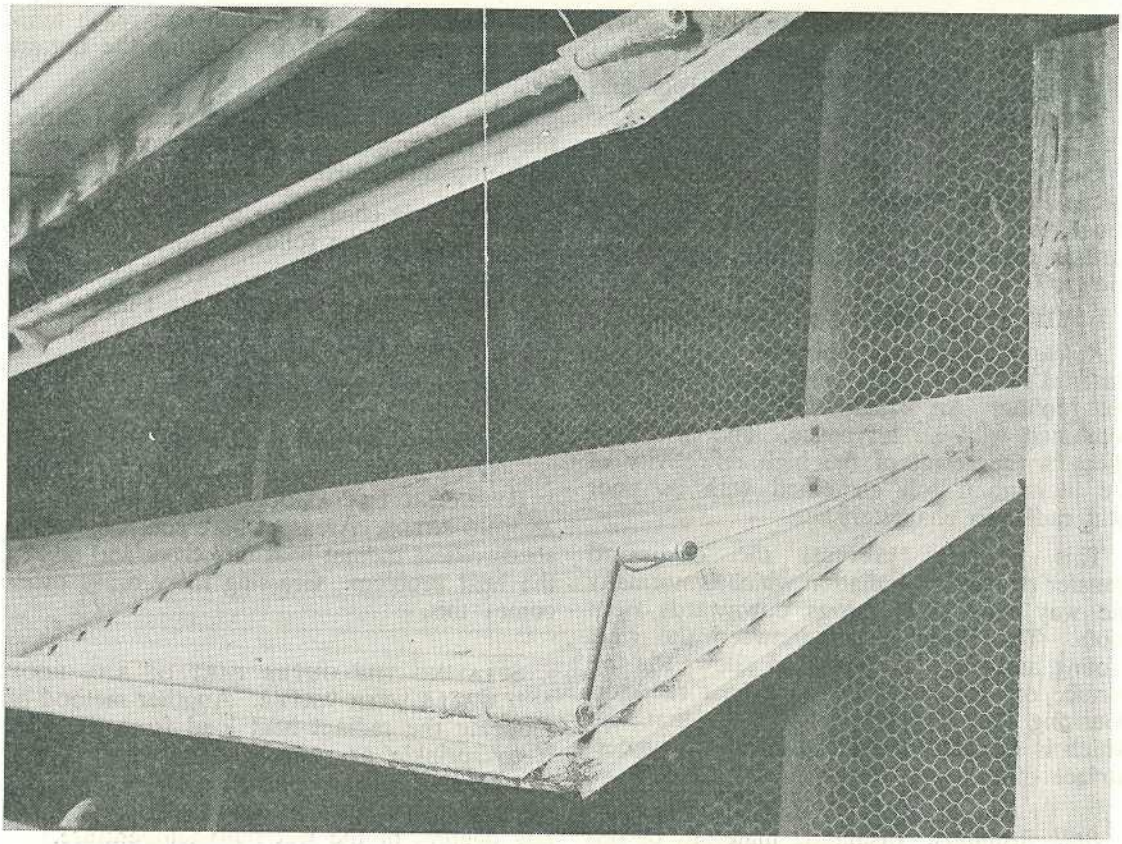
REDUCING THE AMOUNT OF BARE GROUND AROUND SHEDS. Areas of bare soil around the sheds reflect radiant heat into them and add to the heat problem. Grassing these areas overcomes this.

SPRAYING THE OUTER PART OF THE ROOF AND WALLS WITH WATER. Another method of reducing the radiant heat load from the roof is to sprinkle or spray it with water. This method under ideal conditions may reduce the surface temperature of the roof to within a few degrees of the wet bulb temperature.

The quantity of water applied to the roof should be such that most of it will evaporate before it runs off the roof. It is better to apply the water for a short time at frequent intervals, rather than continuously. The walls of enclosed buildings can also be sprayed to reduce the radiant heat load transmitted by them.

It is important to note that the radiant heat load on the bird will be increased as the height of the bird above the ground increases. This is simply because the distance between the bird and the major source of radiant heat (the hot roof) is reduced.

Reducing heat stress on the birds within the sheds. The way to reduce heat stress on the bird is to reduce the heat load that the bird is subjected to in its immediate surroundings. Having done the utmost to reduce the amount of heat entering the shed, it is important now to be concerned with reducing the heat



Keeping wire netting free from cobwebs and dirt helps to maintain good ventilation in poultry sheds.

load that is generated by the immediate environment.

VENTILATION. Adequate ventilation at bird level is essential during periods of high temperature so that heat given off by the birds is removed from the shed.

This not only promotes heat loss by convective means, but also ensures the removal of excess moisture from the atmosphere of the shed. In this way, the efficiency of the evaporative cooling mechanism of the bird is increased. Ventilation requirements vary depending on the temperature and relative humidity of the air and the number and total liveweight of the birds in the shed. Ventilation rates normally lie within the range of 3·75 to 7·5 m^3/hr/kg (1–2 c.f.m./lb.) liveweight.

Air movement and therefore ventilation can be affected by a number of factors. The site of the farm is important, and those sheds situated on elevated sites have been shown to have better air movement that those in low-lying areas. On low-lying sites, surrounding higher ground restricts air movement.

Low-growing trees and undergrowth close to poultry sheds cut down air movement through the shed; so do sidewall battens and fixtures such as feed hoppers. Other sheds also act as barriers to air movement.

Any accumulation of dust and cobwebs on netted partitions and side walls greatly reduces air flow, even in sheds on elevated open sites.

FOGGING AND WATER SPRAYS. These are the most effective procedures for preventing

deaths from heat stress. Wetting the bird is the quickest and most effective method of reducing its temperature. Whether this is done with a fogging system, hose or knapsack spray is immaterial. The cooling effect on the bird is still the same and results from evaporation of moisture from its body surfaces, particularly its comb, wattles, head and legs.

Roof sprinkling is effective in reducing the roof temperature but interior fogging and water sprays are more effective in reducing the birds' body temperature and the temperature of the environment within the shed.

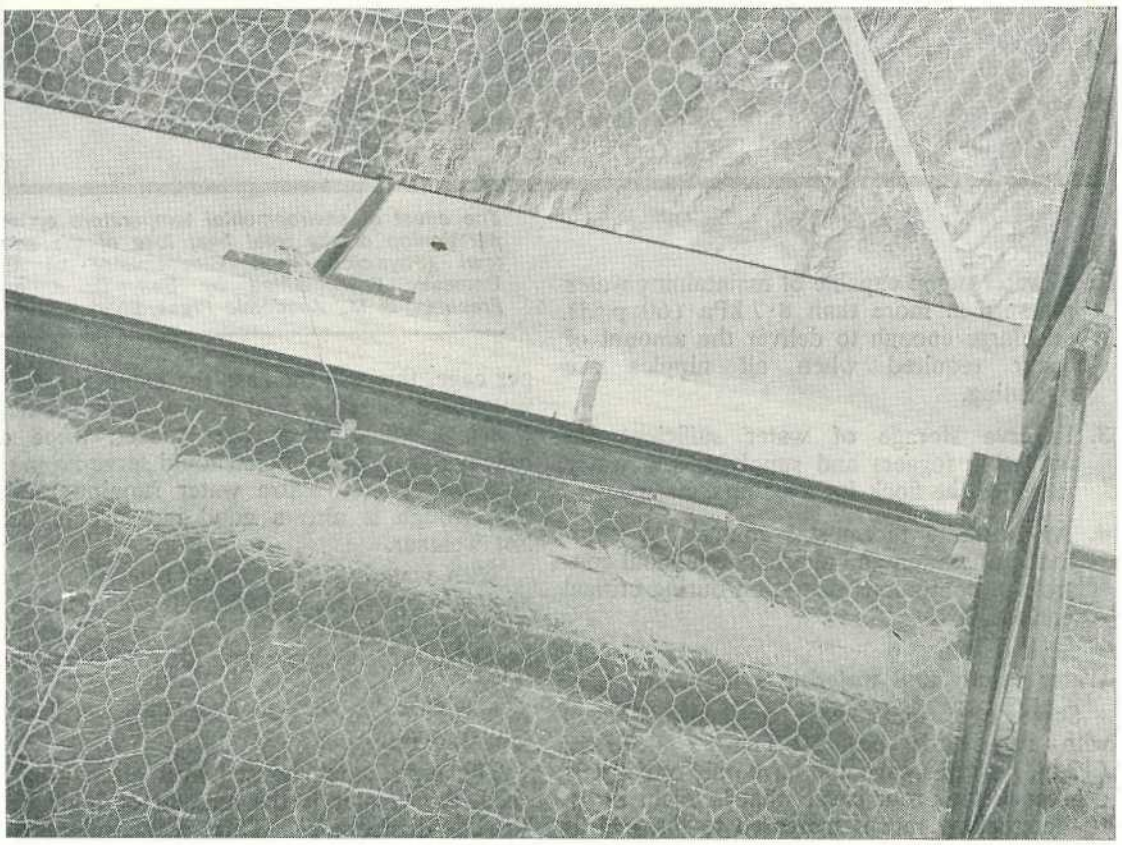
Care must be taken to ensure that the system is operating properly by ensuring that: fogging nipples are not blocked; water pressure is sufficient; and the lines are positioned in such a way that the birds around the perimeter of the shed are getting benefit from the mist.

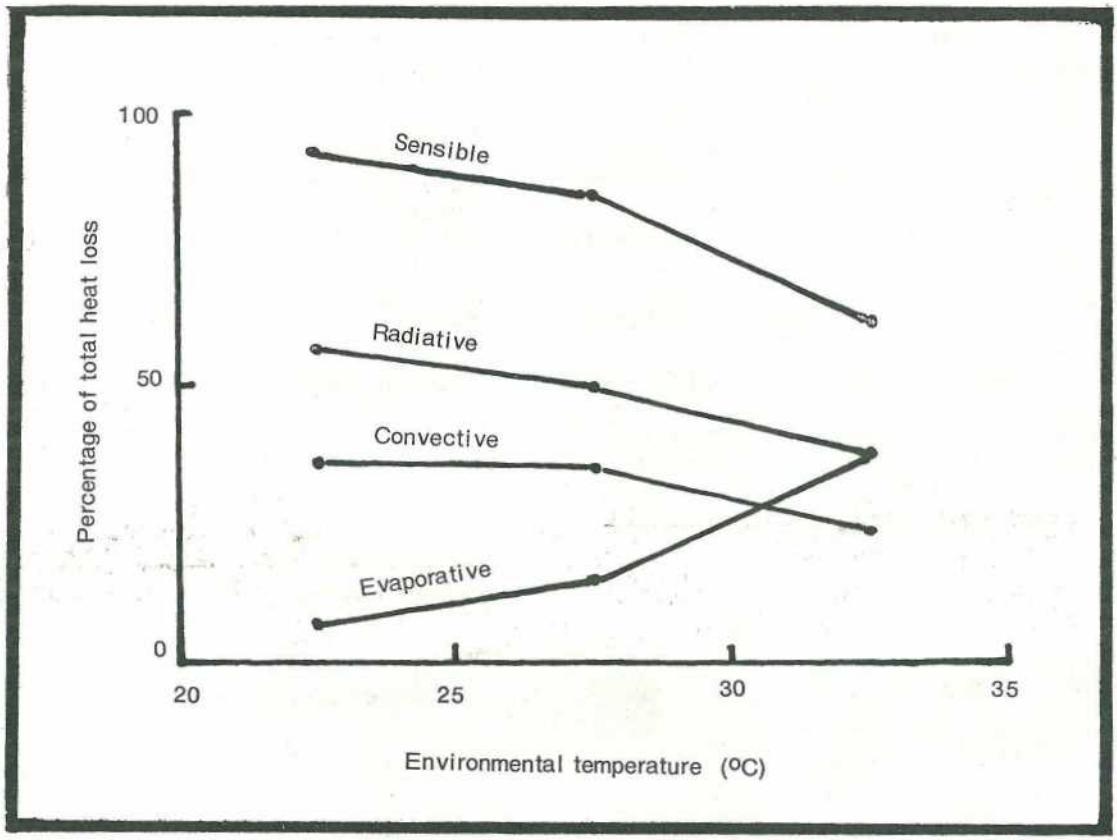
The main requirements for an effective fogging system are—

1. An overhead system of water pipes fitted with double fogging nipples at 1·8 to 2·4 m (6–8 ft) centres on each line. The lines should be no more than 4·9 m (16 ft.) apart. Nipples vary in their fogging efficiency, but satisfactory types deliver a finely divided mist at water pressure above 8·7 kPa (60 lb./sq. in.) (p.s.i.) and deliver 11·5 to 16 litres (2½–3½ gallons) of water per nipple per hour depending on pressure.

   Fogging lines should be positioned so that all birds at the shed perimeter are fogged, irrespective of wind direction.

Insulation reduces the amount of heat transfer through the skin of the poultry house.





The effect of environmental temperature on the partitioning of the total heat loss of the adult fowl (Physiology and Biochemistry of the Domestic Fowl *edited by Bell, D. J. and Freeman, B. M.; Academic Press, London; 1971).*

2. A water pump capable of maintaining water pressure at more than 8·7 kPa (60 p.s.i) and large enough to deliver the amount of water required when all nipples are operating.
3. Reserve storage of water sufficient for operating foggers and supplying the water needs of the flock for 24 hours.
4. An accurate thermostat control for automatic operation and alternative manual control for continuous operation during critical periods.

Water supply and watering equipment

Some cage units were originally stocked with two birds per 30·5 cm x 45·7 cm (12 in. x 18 in.) cage and have only one nipple drinker serving four cages, that is, eight birds. If the stocking rate is increased to three birds per cage, this will increase the competition for water and therefore add to the effects of heat stress. Where birds are stocked three or four per cage, one nipple should serve no more than two cages. Extra water running in the drip trough is also a good measure in very hot weather.

With watering 'cups', drip troughs are not normally provided, and where the stocking rate is three or four birds per cage, then one drinking cup should be provided for every two cages.

Stocking rate

The more stock housed in a given area of shed, the greater is the amount of body heat to be dissipated. This will undoubtedly

increase the potential for heat stress and therefore increase the producer's reliance on adequate ventilation and such measures as fogging and roof painting to prevent losses of birds.

Age of flock

Losses from the 1972 Christmas heat-wave were generally higher in older, heavier layers. This may be attributed to the greater thermal insulation which older and heavier birds possess. The amount of subcutaneous fat is likely to be greater in older birds and therefore there is probably a tendency for older birds to conserve more heat than younger ones.

Flock management

It is extremely important during hot weather for producers to watch their flocks constantly throughout the day, looking for heat stress symptoms. The importance of applying cooling measures **early** cannot be over-emphasized. It is too late to start after birds begin to die because, by then, a high percentage of the flock will have been severely heat stressed for some time. Birds in this condition may die when their body temperature reaches 45°C whereas others not so severely stressed previously may not die until body temperature reaches 47°C. For this reason, cooling measures applied early will enable the birds to resist a greater heat challenge later in the day.

Some producers prefer to operate fogging systems manually during heat-waves relying on their own observations of the condition of the flock rather than on thermostatic control.

In an emergency, the first priority must be to wet the birds, other measures are of secondary importance and can wait until the birds have been sprayed.

Egg weight markings now in metrics

AFTER 1 January next year, present egg markings of extra large, large, standard, small and pullet will change to a metric systems of numbers.

This was announced by the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.).

Mr. Sullivan said that the change would result from gazettal of amendments to the Poultry Industry Regulations of 1946.

'It means that the present weight grades, denoted by the letters XLG, LGE, STD, SML and PLT will be altered to the numerals 60, 55, 50, 45 and 40 respectively,' he stated.

'These numerals represent the lower metric weight limit in grams of the various grades.'

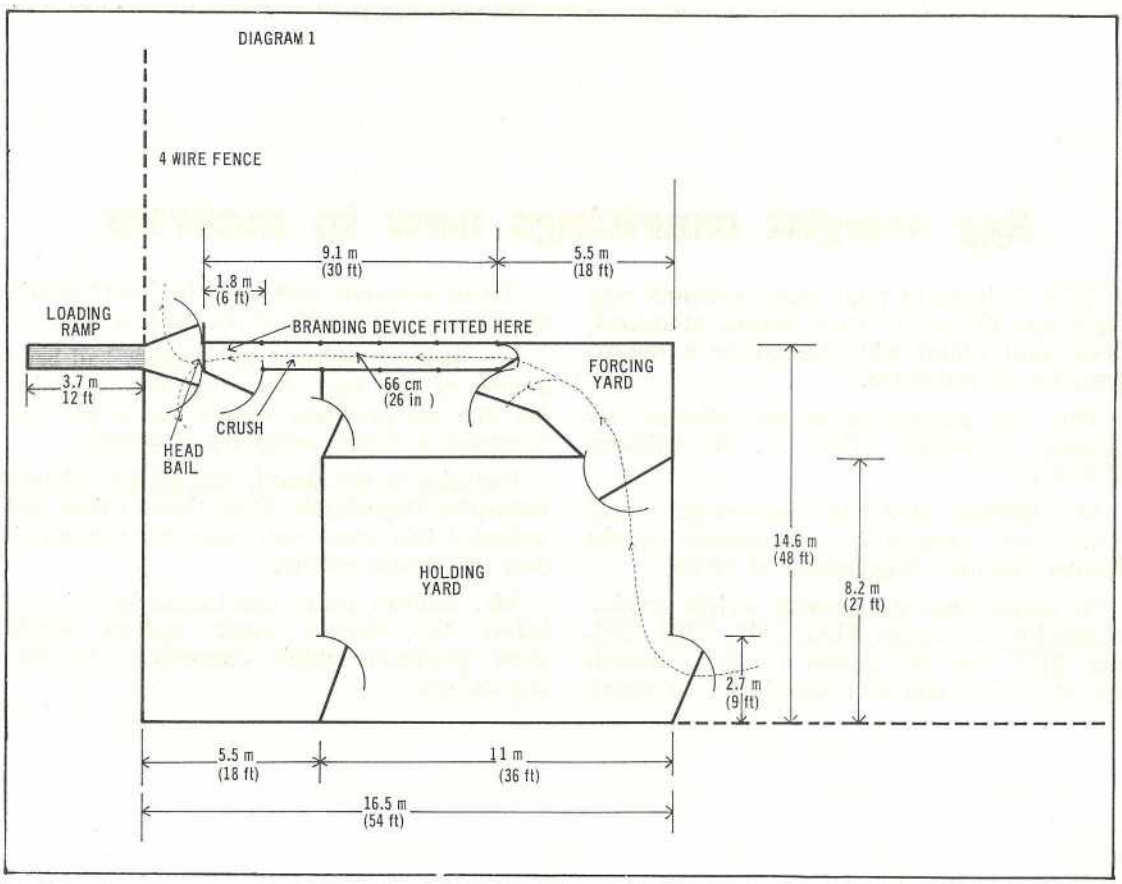
Mr. Sullivan said that the changes had been sought by the Egg Marketing Board, which felt that the proposed system would give the consumer a clearer indication of weight.

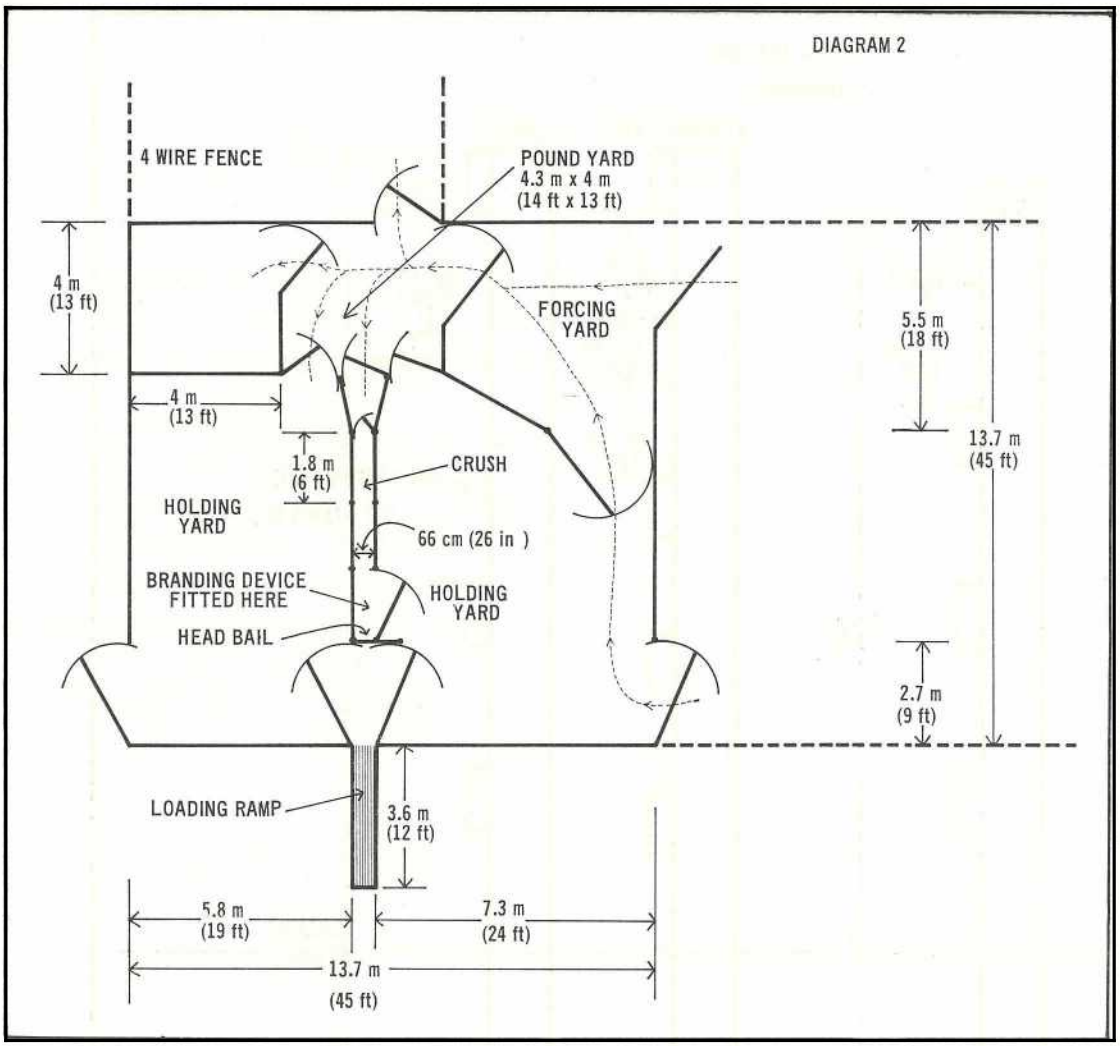
Inquiries to the Board, and to the Primary Industries Department, from time to time had indicated that some consumers were confused over the present system.

Mr. Sullivan added that the period of time before the changes would operate would allow producers ample opportunity to alter egg stamps.

Yards for a small beef herd

by R. TYLER, Beef Cattle Husbandry Branch.





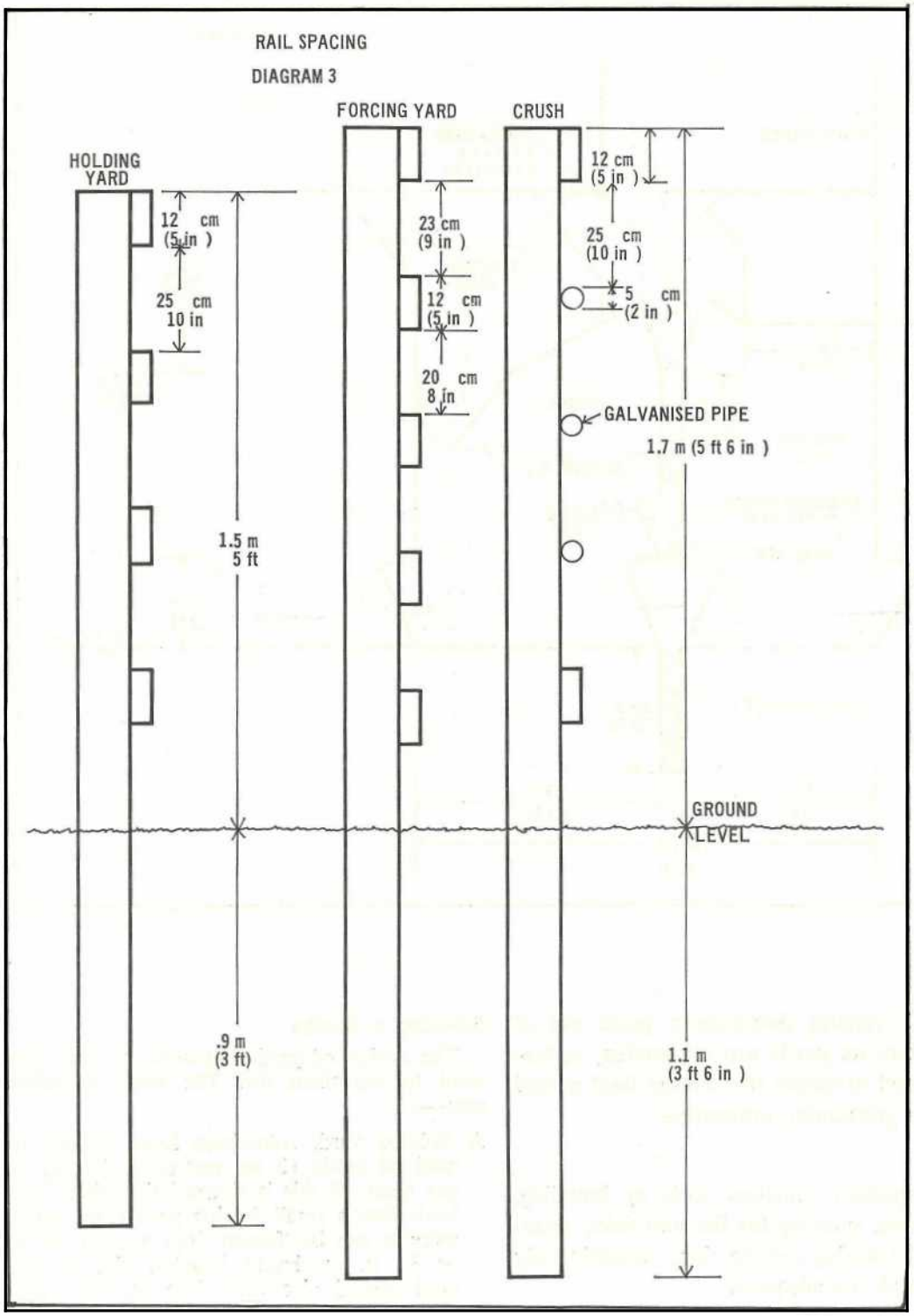
CATTLE raising demands a good set of yards but, as yards are expensive, cattlemen need to select the design best suited to their particular enterprise.

Management practices such as branding, inoculating, spraying for lice and ticks, weaning and trucking can be done properly only when yards are adequate.

Selecting a Design

The design of yards depends on what you want to use them for. The basic essentials are:—

A holding yard, sometimes large enough to hold all cattle (3 sq. metres or 30 sq. ft. per head) if this is deemed desirable. This leads into a small forcing yard from which animals can be 'forced' into a crush (9 m or 30 ft. maximum length). The forcing yard should also open into another small


RAIL SPACING
DIAGRAM 3
HOLDING YARD
FORCING YARD
CRUSH
12 cm (5 in)
25 cm 10 in
1.5 m 5 ft
.9 m (3 ft)
23 cm (9 in)
12 cm (5 in)
20 cm 8 in
12 cm (5 in)
25 cm (10 in)
5 cm (2 in)
GALVANISED PIPE
1.7 m (5 ft 6 in)
GROUND LEVEL
1.1 m (3 ft 6 in)

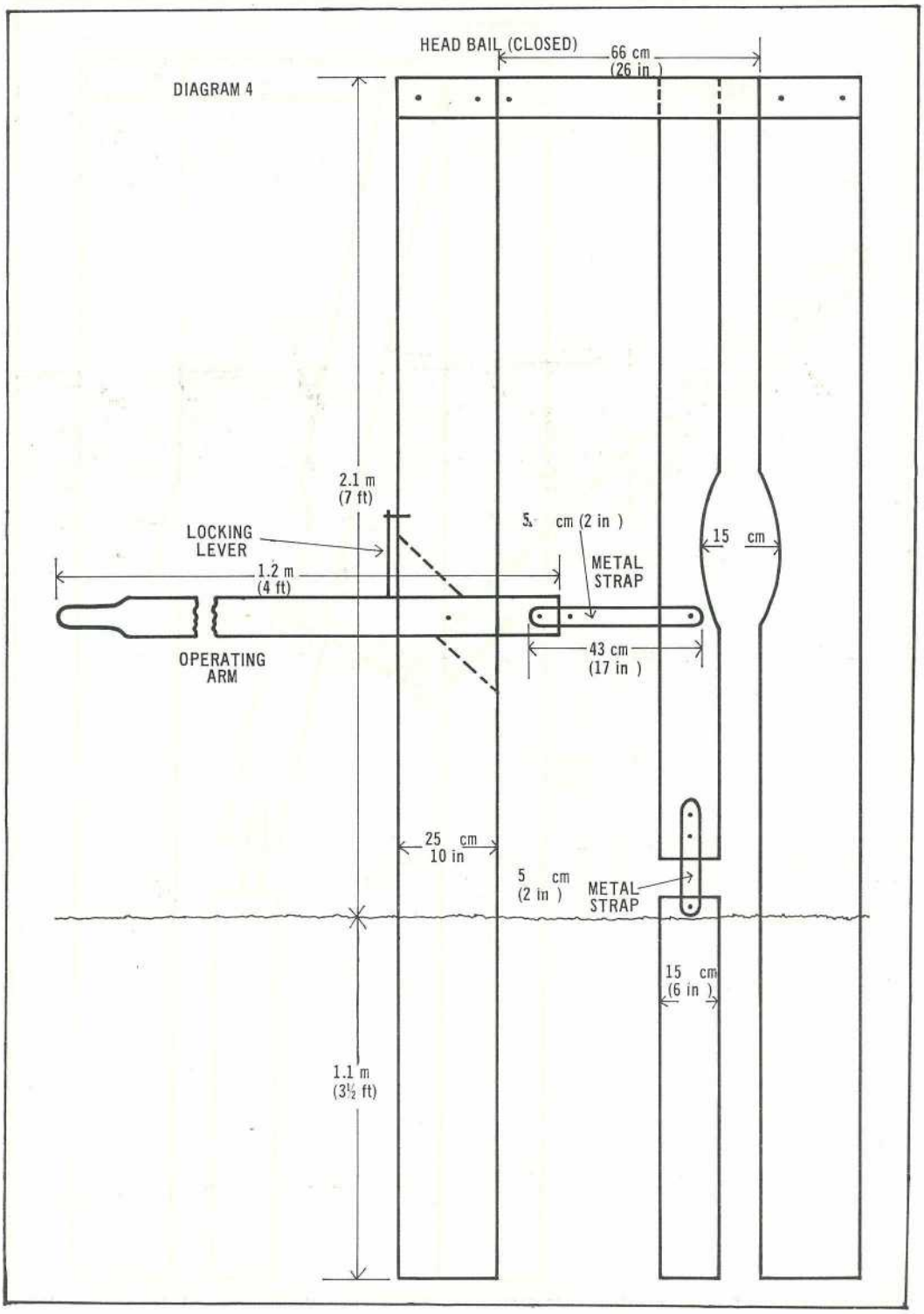


DIAGRAM 4
HEAD BAIL (CLOSED)
66 cm
(26 in)
2.1 m
(7 ft)
LOCKING
LEVER
1.2 m
(4 ft)
OPERATING
ARM
5 cm (2 in)
METAL
STRAP
43 cm
(17 in)
15 cm
25 cm
10 in
5 cm
(2 in)
METAL
STRAP
15 cm
(6 in)
1.1 m
(3½ ft)

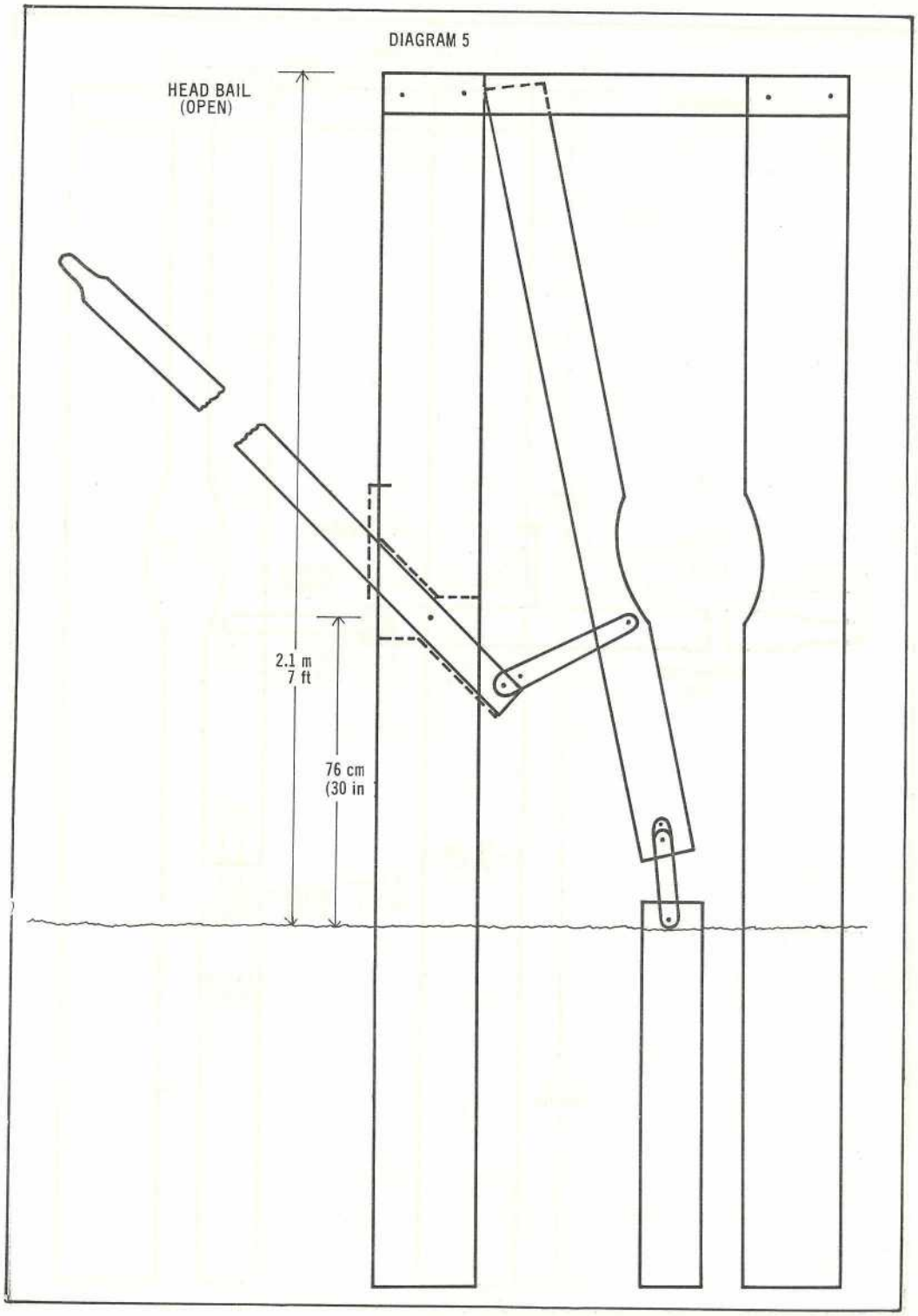
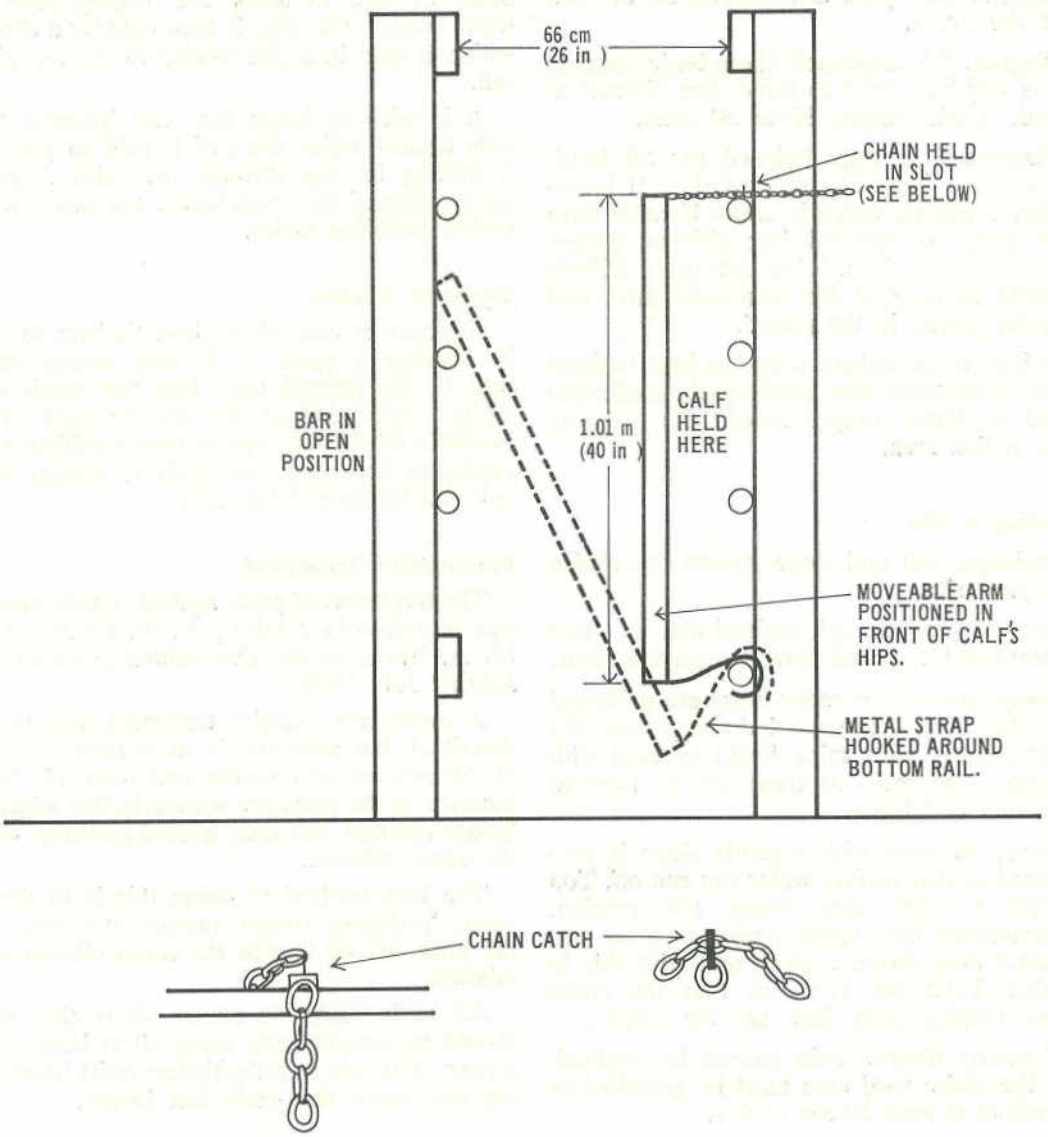


DIAGRAM 5
HEAD BAIL
(OPEN)
2.1 m
7 ft
76 cm
(30 in

DIAGRAM 6

CALF HOLDING DEVICE FOR BRANDING



yard (2 sq. metres or 20 sq. ft. per head) so that those cattle not required in the crush do not have to be returned to the holding yard. A loading ramp that usually leads off the end of the crush, and another small holding yard also leading off the end of the crush.

Diagram 1 incorporates these basic features and is relatively easy to build, but difficult to extend. It will handle 30 to 50 head.

Diagram 2 is also designed for 50 head, but with the possibility of extension. It incorporates a pound, which is useful if cattle have to be sorted or 'drafted' into different groups on frequent occasions. It is a little more difficult to build because of the numerous gates and irregular panels in the pound.

In both these designs, a dip has been omitted on the assumption that small numbers of cattle would be hand sprayed should the property be in a tick area.

Selecting a Site

Drainage, soil and slope govern the choice of a yard site.

- The site must be well drained and no water from outside should flow through the yards.
- Sandy, gravelly or rocky areas are preferred as these soils have good drainage and dry out quickly after rain. Avoid an area with many large rocks as these can be harmful to man and beast.
- Slope. An area with a gentle slope is preferred so that surface water can run off. Too great a slope may cause soil erosion. Remember that cattle prefer to walk up, rather than down, a slope and with this in mind, build the yards so that the crush and forcing yard face up the slope.

If poorly drained soils cannot be avoided, then the entire yard area must be gravelled to a depth of at least 30 cm (1 ft.).

Branding

A costly calf crush and cradle are unnecessary for small numbers of calves and a cheap but effective branding arrangement is shown in Diagram 6.

The calf is caught in the head bail and held firmly against one side of the crush by means of a pipe, placed in front of the calf's hips and hooked over the lowest rail of the crush. This rail of the crush should also be made of pipe to allow the holding pipe to move freely. The pipe is kept tight by a chain, which is held in a slot welded to the top pipe rail.

It is wise to block the gaps between the rails against which the calf is held to prevent it putting its legs through the rails. A gate on the side of the crush where the calf is held makes branding easier.

Types of Timber

Ironbark is one of the best timbers to use in building a yard. It is very strong, lasts well in the ground and does not catch fire easily. Other timbers that can be used when available are gidgea, cyprus pine, coolibah and yapunyah for posts and gidgea, mulga, bull oak and lancewood for rails.

Preservative Treatment

The treatment of posts against termite attack was described in detail by N. W. Heather and M. A. Burns in the *Queensland Agricultural Journal* July 1970.

A rather less effective treatment than those described, but adequate in most areas, uses a 50:50 mixture of creosote and sump oil. The bottoms of the posts are soaked in this mixture before erection and then treated annually with the same mixture.

The best method of doing this is to dig a small V-shaped trench around the base of the post and fill it with the sump oil-creosote mixture.

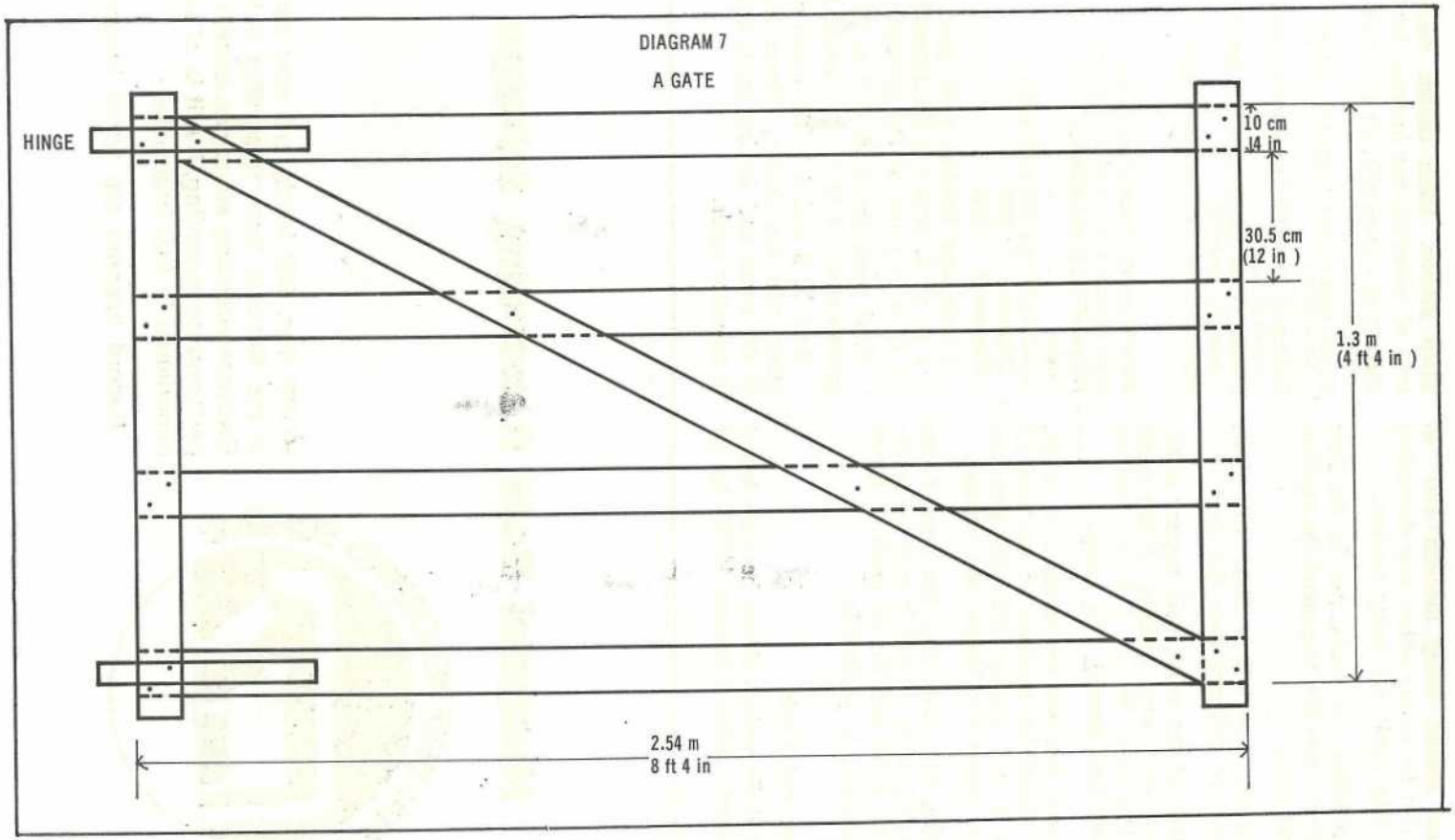
All cattle yards, no matter where they are, should be painted with sump oil at least once a year. This will help the timber resist weathering and make the yards last longer.

Some Helpful Hints

If cattle are to be yarded for long periods (1 day or more) shade and water are essential. These are best provided in the larger holding yards or in a small paddock (0·5 to 1 ha) that runs off the yards.

DIAGRAM 7

A GATE



All gates should swing through 180° so that they can be swung either way depending on which way cattle are being worked.

When building the yards, put in the four outside corner posts first then mark the position of all other posts.

The loading ramp is best filled with rocks with a layer of concrete over the top.

The width of the crush may appear small, but will take very large animals. If the crush is any wider than 66 cm (26 in.) smaller animals will turn around very easily.

Make each gate for the space it is to fit. The gate should be between 15 cm and 23 cm (6 to 9 in.) smaller than the gateway. This allows room for hinges and catches.

Concreting the posts into the ground can lead to early rotting, though it may be necessary for the crush and for all posts in heavy soils. Gravelling is preferable.

Dimensions and Costs

Costs and dimensions shown here are based on Toowoomba prices (January 1974) for all sawn timber. Bush timber will reduce the cost of materials but increase labour costs.

Posts 12 cm x 12 cm (5 in. x 5 in.) x 2·4 m (8 ft.)	$4 each
Timber rails 12 cm x 5 cm (5 in. x 2 in.) x 2·7 m (9 ft.)	$1.80 each
Rails gates 10 cm x 2·5 cm (4 in. x 1 in.) x 2·4 m (8 ft.)	$0.60 each
(Timber prices quoted at $24.50 per 100 super ft. ironbark)	
Pipe rails 5 cm (2 in.) galvanized pipe ..	$11.34 per 6·4 m (21 ft.) length
Bolts 20 cm x 1·27 cm (8 in. x ½ in.) ..	25c each
Bolts 10·0 cm x ·95 cm (4 in. x ⅜ in.) ..	10c each
Hinges 20 cm (8 in.) gudgeon	76c each
Hinges	90c pair

Approximate costs (materials only)

Diagram 1 $580
Diagram 2 $540

Crush and forcing yard posts should be 1·1 m (3 ft. 6 in.) in the ground and 1·7 m (5 ft. 6 in.) out of the ground.

Yard posts shoud be 0·9 m (3 ft.) in the ground and 1·5 m (5 ft.) out of the ground.

Rails 2, 3 and 4 in the crush are pipe, all other rails are timber. There are five rails in the crush and forcing yards and four rails in all other yards.

Millets for grain and grazing

Shirohie millet.

by N. J. DOUGLAS, Agriculture Branch.

THE term millet embraces several small-seeded, summer-growing grain and grazing crops. Although the various millets belong to different botanical species, their field behaviour is similar.

Production of grain varieties is restricted to the central and southern Queensland grain-growing belts but some 95% of the crop is produced on the Darling Downs. This is because the climate and soil type are suitable for seed production and farms in the area are geared mechanically to handle grain.

In the last 10 years, the area of white French millet grown for grain has varied between 10 000 and 20 000 hectares with the average area planted being 14 000 ha. The other millets and panicums grown in the same period have ranged in area from 5 000 to 24 000 ha, with an average area of 10 000 hectares planted.

Millet grain is used to supply the bird-seed market. As this outlet is restricted, the market is frequently unstable. However, the opening of a Japanese market in recent years has improved the situation. Shirohie millet, in particular, has been developed for this market.

The grazing millets are a minor alternative to the hybrid Sudan grass and forage sorghums. The area of millets planted for grazing in the last 10 years has varied between 7 000 and 15 000 hectares with an average area planted of 9 500 hectares. This area usually included a percentage of dual purpose millets which were grown primarily for grazing but which could be harvested for seed in a favourable season.

The only true grazing millet is the pearl millet, commonly called bulrush millet.

Panorama millet.

The area planted to this millet has never reached significant proportions, possibly because of the high price of seed and the difficulty of establishing the crop on heavier soil types.

Classification

Unfortunately, any one species of millet is known under a number of different common names in different parts of the world. Table 1 lists the main types grown in Queensland and gives the common names officially accepted in this State for each type.

The species used in Queensland for the various purposes are shown with local common names in Table 1. This table also shows cultural data for the various species.

Climate and time of sowing

The crop is generally limited by cold temperatures and water availability. Plantings should be delayed until the danger of frosts is over, that is, until September. Plantings should be made into a seedbed of good tilth with adequate surface moisture. Rolling may be an advantage to ensure that the seed is brought into contact with moist soil.

Subsequent rains are required, first to enable secondary roots to penetrate and then to ensure that adequate water is available because millets, with the exception of pearl millet, are shallow rooted.

While frosting may damage seedlings and will damage mature plants, it may be an

Pearl millet. Regrowth coming into head.

Harvesting white French millet.

advantage in late grain crops to kill immature heads which increase the moisture content of harvested grain. For this reason and the fact that mid-season crops are often subjected to heat damage at the time of seed set, late plantings (late January to February) are favoured for grain crops.

TABLE I

NOMENCLATURE AND CULTURAL DATA FOR MILLET SPECIES

Type	Botanical Name	Common Name*	Sowing Rate kg/ha	Early Season Planting Days to Flowering
Grain	*Panicum milisceum*	White French millet (Millet)	10	68
Grain	*Setaria italica*	Panicum (Dwarf setaria)	6	56
Grain	*Setaria italica*	Panorama millet (Panorama panicum)	6	62
Dual purpose	*Echinochloa crus-galli* var. *frumentacea*	Japanese millet	8	62
Dual purpose	*Echinochloa crus-galli* var. *frumentacea*	Shirohie millet (White Japanese millet)	8	71
Grazing	*Pennisetum typhoideum*	Pearl millet (Bulrush millet)	12	..
Grazing	*Echinochloa crus-galli* var. *edulis*	White panicum (Siberian millet)	7	..

* Alternative common name given in brackets.

Soils

Although millets may be grown on a wide-range of soil types, lighter-textured, neutral to slightly acid soils are preferred. Millets germinate readily and evenly at planting depths of approximately 3 cm. Satisfactory seedbeds for such shallow plantings are difficult to prepare on heavy soils. Where these soils are used, the planting rate should be increased.

Planting rates

The planting rates vary with seed size and soil type. The recommended planting rates for the range of cultivars at present in use are shown in Table 1. These planting rates are for medium-textured soils and can be increased for heavy and lowered for light soils.

Fertilizers

Most millet crops will respond to nitrogen, particularly where they are being double cropped. However, it must be remembered that excess nitrogen will cause the crops to lodge.

In grazing millets, particularly where subsoil moisture is available, the use of nitrogen generally proves beneficial. Up to 50 kg per ha of elemental nitrogen could be used on grazing crops; half of this could be applied before planting and the remainder after the first grazing. For grain crops, up to 25 kg per ha of nitrogen is suggested.

In soils known to be phosphate deficient, a phosphate fertilizer should be used at planting. Seed should not be sown down the same chute as nitrogen fertilizer.

If both nitrogen and phosphate are required, the nitrogen may be applied earlier with the final cultivation.

Weed control

The millets are fast growing and often are untroubled by weed competition. However, if necessary, millet can be sprayed with 2,4-D or M.C.P.A. to control broad-leaf weeds. M.C.P.A. should be used in preference to 2,4-D.

For maximum crop safety, rates of application should not exceed 560 grams of acid equivalent M.C.P.A. or 2,4-D per hectare. Spraying should be carried out at the tillering stage when the crop is approximately 15 cm high. The crop should never be sprayed once the heads start to form in the sheath.

Some damage to the crop is possible whenever chemical herbicides are used. Chemicals should always be used in accordance with the manufacturer's directions for use.

Harvesting and marketing

With the exception of the pearl millets, the group, provided they are clean, mature crops, present no harvesting problems but extra care may be needed in badly lodged and tangled crops.

The seed production of pearl millets is made difficult by the height of the plant. An ungrazed stand may reach 3 m and more. A strategic grazing or slashing may keep the crop at a reasonable height for harvesting.

The fact that the millets thresh easily can introduce one problem which should be avoided. This is the problem of over-moist grain. Experience has shown that millet grain stores safely when the grain moisture content is 13% or lower.

Because this crop threshes so readily, it is possible to harvest it satisfactorily when the grain moisture content is as high as 20%. At this moisture content, however, millet grain will heat up and mould in storage unless the grain is artificially dried.

Where large amounts of impurities such as green weed leaves, stems and fruits occur, immediate seed grading is essential if heating of the grain is to be avoided.

Only new sacks should be used for the small panicum grain. Once-used sacks or poly sacks can be used for Japanese millet and Shirohie for they are lighter to handle and the seed does not run so readily if the bags are holed. Export seed of the panicum is mainly required to be double bagged. Alternatively, seed may also be exported in bulk to Japan. The grain density for millets is 62 kg/hl. replacing the customary 50 lb/bushel measurement.

MILLET CULTIVARS

Grain millets

As grain crops, millets are easy to handle and are used mainly as catch crops or change-over crops in the rotation.

WHITE FRENCH MILLET. White French millet may yield as much as 4 tonnes per ha. Its plants stool readily and poor plant stands often give good results. It is easily identified as it is the only common millet with an open, drooping head. Seed will shatter quickly in winds and uneven ripening can be a problem.

With ample moisture, well-established plants will thrive during hot summer weather. Consequently, late December-February is the sowing period for this variety which matures in about 90 to 100 days.

The stems and leaves of white French millet are hairy and fibrous and these characteristics make it undesirable as a grazing or hay crop. The seed is creamy white to straw coloured. However, under adverse growing conditions, the crop can be grazed.

It is susceptible to a number of plant diseases, the most important of which is smut*. Seed treatment with thiram fungicide should give useful control of the disease carried on the seed and partial control of soil borne infection. Under conditions of regular high disease incidence crop rotation may be warranted. Other diseases of minor importance are anthracnose† and leaf blast‡.

PANICUM OR DWARF SETARIA. Panicum is used solely for grain production, and has enjoyed great popularity in the grain-growing areas. This appears to be because it is the quickest-maturing millet available. Crops ripen in about 80 days.

It produces less leaf than the other millets and this characteristic, coupled with its quick maturing habit, reduces its moisture requirements. Accordingly, panicum is in demand as a quick change-over crop from winter to summer crop production.

Unfortunately, it is very susceptible to leaf blast and head blight caused by the fungus *Pyricularia grisea* (see illustrations on pages 475 and 476). Sometimes crops have been destroyed. Later plantings are preferred, as such crops are less susceptible to damage. The seed is straw coloured.

PANORAMA MILLET. This millet was selected and increased by Mr. C. Ziebell on his property 'Panorama' at Mt. Tyson on the Darling Downs. Panorama is a taller and more robust plant than panicum and the seed-heads can be twice as large.

As the crop matures, the seed-heads bend over from the weight of the seed. A slightly heavier planting rate is thus preferred to reduce head size.

This panicum has proved to be acceptable to the Japanese market and on the Central Downs it is fast replacing panicum. It has good tolerance to leaf and head blast. The stubble makes first-class hay.

On the average, it would yield about half as much again as panicum and, in spite of a slightly lower price per tonne, the higher yields allow high returns. Yields up to 3·75 tonnes per hectare have been obtained and an average well grown crop would yield in the vicinity of 2·5 tonnes per ha. The seed is, as for panicum, straw coloured. It appears to be resistant to seed shattering.

DISTINGUISHING SETARIA SEED. The seeds of the different setarias are difficult to distinguish. The common method used to distinguish panicum from Panorama millet relies on the feel of the seed. The panicum has a smoother feel than the Panorama which is more 'gritty' to the touch.

Dual purpose millets

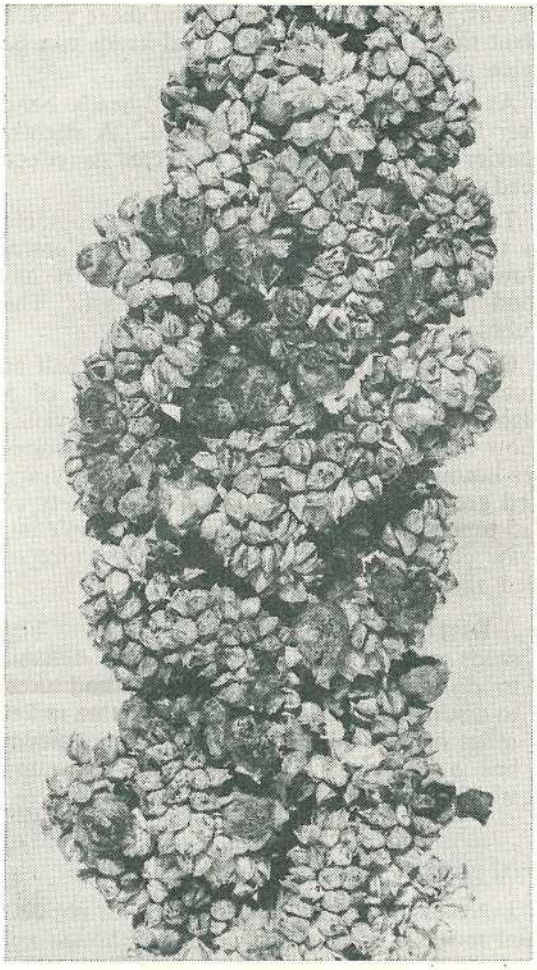
JAPANESE MILLET. This is the most popular dual purpose millet. It has finer, although not necessarily more palatable, leaves and stems than white panicum. It is an extremely quick grower but does not ratoon as well as white panicum.

Under good growing conditions it is ready for grazing in 4 to 6 weeks. Grain crops of this millet take about 100 days to mature. Seed colour is greyish-brown.

Japanese millet is for all practical purposes free of disease problems. A bacterial leaf spot caused by the bacterium *Xanthomonas translucens* has been recorded from a South Burnett area but the disease is at present not widespread.

SHIROHIE MILLET. The original selection of Shirohie millet was made by Mr. A. Lemon in 1970 from a commercial crop of Japanese millet growing on his property 'Mindiella' at

* *Sphacelotheca destruens.* † *Colletotrichum graminicola.* ‡ *Pyricularia grisea.*



A smut-affected head of Japanese millet.

Brookstead on the Darling Downs. The selection was made basically on the pale (greyish, off-white) colour of the seed. The initial selection was increased and this variety is more widely grown on the Darling Downs and the South Burnett region than in other parts of the State.

The grain is being produced for the Japanese market. It is confidently expected to replace the present Japanese millet which has a darker seed colour. While it has basically been developed for seed production, it can be used equally well as a grazing crop.

Grazing millets

PEARL MILLETS. This group comprises deep-rooting, tall-gowing, free-tillering annuals. The stems are usually pigmented a purple colour. Peak growth is in late summer and early autumn. As this group is slow in the early stage of growth, planting should be made soon after the danger of frost damage to young plants is over.

The best forage yields are obtained on fertile, well-drained soils where rainfall of 500 mm during the grazing season may be expected.

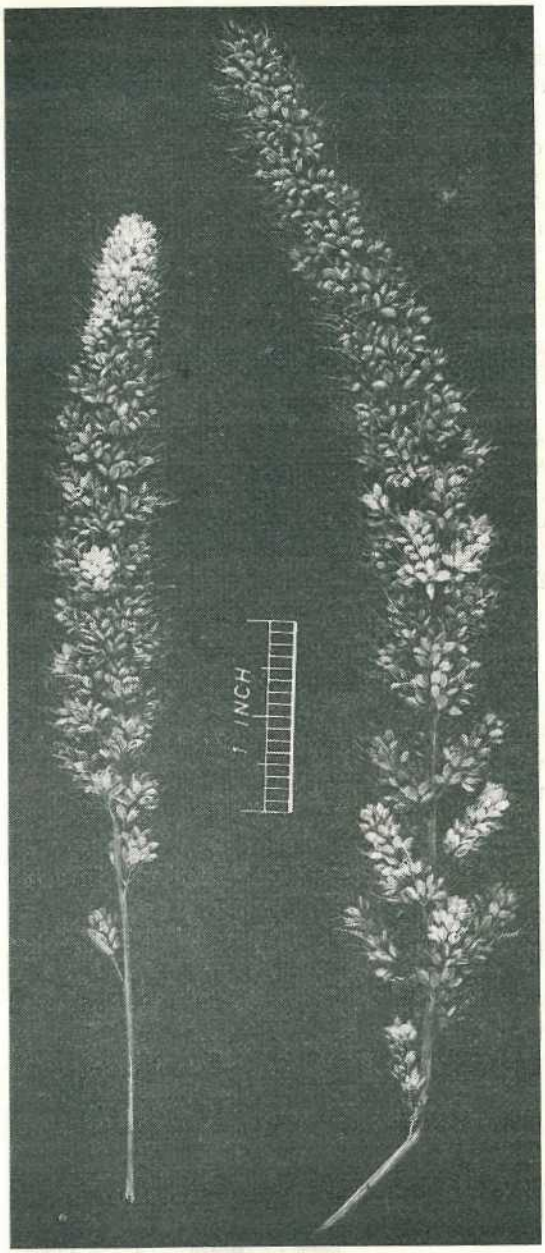
Because of their good, late-summer production, they outyield Japanese millet and white panicum and approach the yield of the forage hybrid sorghums without the risk of prussic acid poisoning.

The feeding value is high and this is maintained because the crop does not seed early. It should be grazed in a similar manner to grazing sorghum. This crop should not be allowed to grow beyond 1 metre before grazing is commenced.

While grain yields up to 2 tonnes per ha have been reported, seed production is not easy: 1 tonne per ha would be a more realistic figure. Seed production is rendered difficult by the height of the plant and poor seed set under heat wave conditions.

TABLE 2

Planted late November	Harvested late Jan. kg/ha	Protein %	Regrowth harvested early March kg/ha	Protein %	Total kg/ha
Hybrid Sudan grass	9 524	16·2	3 696	14·4	13 220
Sudan grass	6 193	13·8	5 023	11·9	11 216
Hybrid pearl millet	8 528	16·2	1 073	16·4	9 601
Tamworth pearl millet	7 257	19·1	931	19·7	8 188
Katherine pearl millet	4 610	23·4	1 887	15·9	6 497
Ingrid pearl millet	3 889	23·5	2 268	13·0	6 157



Head blight. Note the blanched portions of the head showing disease infection.

Varieties of Pearl Millet

Mx001. This is the first hybrid Pennisetum millet produced commercially in Australia. This hybrid produces fine leaf forage from vigorous, tillering plants. It is early to mid-season maturity and it makes good initial growth.

Tamworth Pearl. This variety was selected and released by the Tamworth Agricultural Research Station. It is early to mid-season in maturity. The leaves are medium broad and almost free of hair. The stems do not have the purple pigmentation common in most other pearl millets.

Katherine Pearl. Selected and released at the Katherine Research Station in the Northern Territory, Katherine is a very late flowering variety. It has dark-green leaves which are covered with hair.

Ingrid Pearl. Ingrid also was selected and released at the Katherine Research Station in the Northern Territory. It is 7 to 14 days earlier in maturity than Katherine and makes more vigorous early growth than that variety. Leaves are lighter green than Katherine, broader and much less hairy. Very little of this variety is now grown.

No diseases of importance have been recorded on the Pearl millets except in north Queensland where a *Cercospora* leaf spot has been recorded.

Table 2 gives a comparison of dry matter yields of the pearl millets, Sudan grass and a hybrid Sudan grass when grown in fertile soil with supplementary irrigation.

White Panicum. White panicum is more highly regarded as a grazing crop than Japanese millet. It has a semi-prostrate growth habit which is especially marked in light stands. This distinguishes it from other millets. Its stems, although coarse in appearance, are readily eaten by stock.

It is a most vigorous grower and, if grazed early after secondary roots have developed, several regrowths will occur.

Seed crops planted at the same time mature 2 to 3 weeks after Japanese millet. The seed is creamy grey and decidedly lighter in colour than seed of Japanese millet.

A disease problem that has appeared with this cultivar is covered smut caused by a fungus *Ustilago tricophora*. Growers are advised to use a thiram seed treatment before planting to reduce the incidence of this disease.

Millets for hay and silage

The grazing millets, white panicum, Japanese millet and pearl millets, are satisfactory for fodder conservation. Grain types are not recommended for conservation.

Pearl millet and white panicum, because of their coarse stems, take longer to cure for hay than Japanese millet. Pearl millet is best cut for hay before flowering but the others can be cut in the early heading stage. Hay conditioners should be used for quicker curing.

The grazing millets also make reasonably good silage. Yields up to 35 tonnes per ha of green matter can be obtained from Japanese millet and white panicum and 50 tonnes per ha from the pearl millets. Their value as silage is enhanced by the addition of legumes.

A suggested sowing mixture for this purpose is 5 to 6 kg per ha of these millets and 10 kg per ha of cowpeas or lablab bean (dolichos). Lablab bean is grown with the pearl millets. The millets should be in the firm dough stage when cut, but then it still may be necessary to wilt to reduce the high moisture content of vigorously grown crops before placing it in the silo.

Feed value of millet grain

The millet grains, although used primarily as bird seed, may also be used as stock food. Analyses suggest that all millets have a very similar composition and digestibility and are of equal feed value to sorghum and maize grown under similar conditions.

The feeding value of any one is, however, not constant. It may vary considerably with soil type and season.

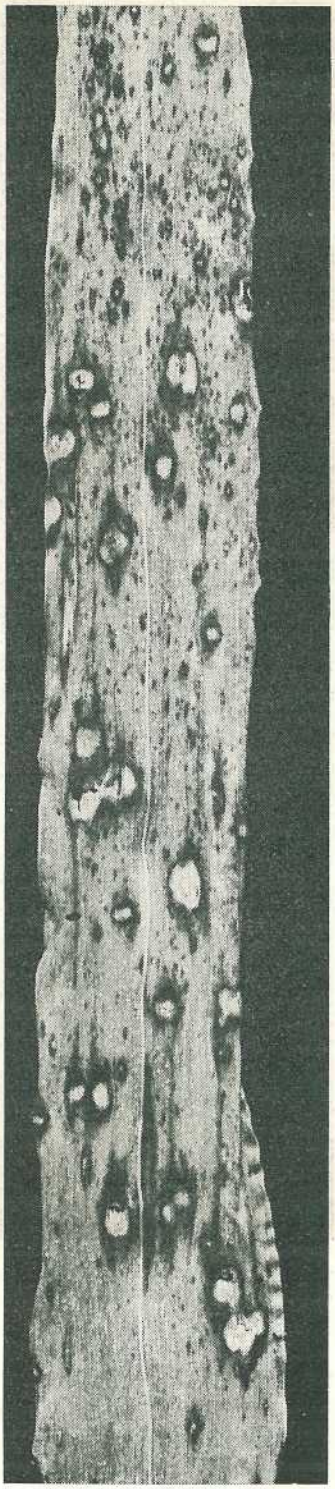
Crop profitability

Traditionally, farmers have devoted only a small proportion of their potential cash cropping area to bird-seed crops.

This is because returns from these crops are unreliable. Prices tend to fluctuate according to the prevailing supply and demand situation. Most farmers like to be in a position to store the crop when returns are low in anticipation of higher prices at a later date.

A simple means of comparing the relative profitability of the bird-seed crops is to determine their expected gross returns per hectare. Gross returns per hectare are obtained by simply multiplying the yield per hectare in tonnes by the price per tonne for the crop in question.

A comparison of profitability with alternative cash crops such as sunflowers can be undertaken by using the gross return per hectare concept. However, the fluctuating nature of bird-seed prices and the apparent lack of a consistent relationship between the prices for the different bird-seeds makes it difficult to forward-estimate gross returns of the bird-seed crops.



Leaf blast symptoms in panicum.

Insect pests of millet

by P. D. ROSSITER, Entomology Branch.

No regular major pests of millet crops exist in Queensland. The following are some insects which cause occasional damage—

False wireworm

Serious damage to the plant stand can be caused by the feeding of false wireworms on the seed or developing roots and shoots of the seedling.

Most serious damage can be expected in September-October plantings where this pest is present. The incorporation of lindane, at 1 gram of the active constituent per 200 metres of row, in the planting furrow will reduce plant losses.

Lindane may be applied as a dust, mixed with fertilizer or an inert filler and distributed through the fertilizer box or as a spray directed into the planting furrow.

Seed-harvesting ants

Certain species of ants may either eat the germ from the seed or transport the seed to their nests. In either case, the desired plant density will be upset.

In areas where this problem is expected, control may be achieved by mixing 150 grams of 20% lindane dust with 50 kilograms of seed immediately before planting. Prolonged contact between the seed and the insecticide may reduce germination.

Another approach is to increase seeding rates when ant damage is anticipated.

Cutworms

In some seasons, the plant stand may be seriously reduced by the activity of cutworms which chew through the seedling stem at or below ground level.

The grubs, which are about 35 mm long and vary in colour from a grey-green to a dirty brown, usually rest in the soil during the day and emerge to feed at night.

Sprays of either trichlorphon (500-700 g/ha) or endosulphan (750 g/ha), applied preferably just before nightfall, will control these insects.

Armyworms

Armyworms may attack either seedlings or the more mature plants. Infestations in seedling crops can cause serious plant losses. The insects feed on the leaves of older plants. This damage is of little significance unless high populations of the pest are present.

The grubs vary in colour from green to black with two distinctive longitudinal stripes on each side of the body and are up to 50 mm long. The insecticides trichlorphon and endosulphan, as used for cutworm control, will control this pest.

Budworms (Heliothis)

The caterpillars of Heliothis may occasionally attack the developing seed-head. When control of this pest is required, endosulphan (750 g/ha) may be applied as a spray.

Stem borers

In recent years, crops of white French millet have been attacked by an insect which feeds inside the stem and cuts off the seed-head from the remainder of the plant.

Despite a number of attempts, it has not yet been possible to determine what insect is responsible for this damage or at what stage the attack occurs. Therefore no control recommendations are yet available.

Sorghum pest control at a glance

by Entomology Branch Officers.

The following table summarizes the recommended pest controls for sorghum production in Queensland. Compilations of this nature cannot give comprehensive details on pest identification, cultural approaches to control, or accurate data on the timing and need for specific chemical usage. The summary is presented as a reference or guide and details, where necessary, should be sought from extension officers of the Department of Primary Industries.

Pest	Description of Pest	Damage to Crop	Control * Pesticide unless stated otherwise Dosage Rates are active constituent	Remarks
Ants *Pheidole ampla* and others	The major species is a small (2-4 mm) brown ant. Other species of various sizes and colorations may also be involved	Ants eat out the germ of germinating seed	Mix lindane 20% dust 150 g/50 kg of seed immediately before planting	Prolonged contact of insecticide on seed may reduce germination. The use of press wheels or rollers accelerates germination and minimizes ant attack
False wireworms *Gonocephalum* spp. *Pteroheleus* spp.	Larvae: light brown, elongate, tough-skinned, up to 30 mm long. Beetles: inconspicuous, dark, greyish-black rather flattened, 7 mm long	Larvae attack germinating seed, and seedling roots and shoots. Damage reduces plant stand	Lindane 1 g/200 m of row	Apply in planting furrow as a spray or dust mixed with an inert carrier to enable distribution. The use of presswheels or rollers will minimize attacks
Cutworms *Agrotis* spp.	Larvae: grey-green to dirty, dark-brown, soft-bodied, up to 35 mm long. Moths: heavy-bodied, dark-grey, night-flying, with a wing-spread of 35 mm	Larvae chew through stems at or below ground level. Damage reduces the plant stand	Trichlorphon 550–700 g/ha Endosulfan 750 g/ha Proportionally lower dosage for band treatment to rows	An important pest in occasional seasons. Elimination of weeds at least a month before planting reduces pest activity

Armyworms *Pseudaletia convecta* and *Spodoptera* spp.	Larvae: vary in colour from green to black, with two green, longitudinal stripes on each side of the body. Measure up to 50 mm long. Moths: fawn to brownish coloured with a wingspread of about 35 mm	Feeds on the foliage, giving the plants a ragged appearance. May completely destroy seedlings. Often found in the throats of plants before head emergence	Trichlorphon 550–700 g/ha Endosulfan 750 g/ha	Control rarely warranted except with extreme populations or in seedling crops. TRICHLORPHON SHOULD NOT BE USED ON ALPHA OR PIONEER 846 SORGHUM VARIETIES
Locusts Australian plague locust *Chortoicetes terminifera* Yellow winged locust *Gastrimargus musicus* Migratory locust *Locasta Migratoria* Spur-throated locust *Austracris guttulosa*	35 mm long, black tip on hind wing, red shanks on hind legs 50 mm long, yellow hind wing with centrally placed dark band and clear tip 60 mm long, clear hind wing 75 mm long, spur between front pair of legs, clear hind wings	Swarming populations of locusts (either hoppers or adults) may completely destroy crops in the path of the swarm. Lighter populations feed predominantly on the foliage although the grain may also be attacked	ALL SPECIES EXCEPT SPUR-THROATED LOCUST Maldison 500–700 g/ha Carbaryl 600–700 g/ha Lindane 200–300 g/ha SPUR-THROATED LOCUST Diazinon 550–700 g/ha Monocrotophos 275–550 g/ha AUSTRALIAN PLAGUE LOCUST Fenithrothion 325 g/ha Diazinon 550–700 g/ha MIGRATORY LOCUST Naled 300–450 g/ha Diazinon 550–700 g/ha	Most satisfactory kills are obtained when treatments are directed against small hoppers. Higher dosages are required to kill the larger insects. MONOCROTOPHOS AND FENITROTHION SHOULD NOT BE USED IN ALPHA OR PIONEER 846 SORGHUM VARIETIES
Aphids *Rhopalosiphum maidis*	Bluish-green, soft-bodied insects 2-3 mm long, usually wingless and occurring in colonies in the throat of the plant or in the head	Feeds on the sap in young leaves and immature heads. Usually associated with honey dew secretions and sooty mould development. The loss of sap rarely results in economic damage	Endosulfan 750 g/ha	Chemical control is usually not warranted as natural control factors, parasites and predators, are capable of good population reductions within a few weeks under most conditions
Thrips *Haplothrips* spp.	Small, elongate insects, 1-2 mm long, usually dark-coloured and carrying two pairs of slender wings fringed with hairs	Feed on glumes and related parts but do not appear to affect the grain setting or the weight of the grain		Control of this insect is unnecessary
Sorghum midge *Contarinia sorghicola*	Tiny, fragile fly, 2-3 mm long, with bright, orange-coloured abdomen and a single pair of fine, transparent wings	The maggot stage of the insect feeds on and destroys the developing grain at flowering time	Diazinon 300 g/ha Maldison ULV 550 g/ha Monocrotophos 200 g/ha	Agronomic practices can minimize midge activity. They include—1. Eliminate volunteer sorghums and Johnson grass. 2. Avoid a close succession of planting

Pest	Description of Pest	Damage to Crop	Control * Pesticide unless stated otherwise Dosage Rates are active constituent	Remarks
				times. 3. Avoid planting times which result in the crop flowering during the expected rainy period. 4. Utilize agronomic practices that will reduce the flowering period. Persistent populations of 4-6 or any population greater than 6 midge per head during flowering warrants spray application. Diazinon or maldison sprays should be repeated at 3-4-day intervals (monocrotophos at 5-day intervals) if populations persist, while heads are flowering. MONOCROTOPHOS SHOULD NOT BE USED ON ALPHA AND PIONEER 846 SORGHUM VARIETIES
Corn ear worm *Heliothis armigera*	Eggs: pearly-white, dome-shaped eggs laid singly on head and leaves. Larvae: pale-green to dark-brown, with longitudinal stripes of different shades, up to 35 mm long. Moths: stout bodied, strong-flying, with wingspread of 35 mm. Forewings reddish pink and hind wings creamy yellow with large smoky marginal area	May attack sorghum at all stages up to the maturing of the grain. Primarily a pest of the flower head and developing grain, On young plants, the larvae feed on the leaves, in the throat of the plant	Endosulfan 750 g/ha ..	Control measures on young plants are rarely warranted. Watch for the presence of eggs and young larvae before and during flowering. If required, endosulfan may replace one of the midge spray treatments to combat both pests. Infestations of larger larvae, particularly in the compact heads preferred by the pest, may be difficult to control and will already have caused considerable damage. Attempts to control population levels less than 2 larvae per head at this stage could be uneconomic
Yellow peach moth *Dichororocis puntiferalis*	Larvae: greyish white, often tinged with pink, with darker oval spots on the body, up to 35 mm long. Moths: orange-yellow wings with conspicuous black spots, wingspread 25 mm	Feed on the maturing grain and foul the heads with webbing and excrement. More prevalent in the wetter coastal areas than inland districts		The economic advantage of attempting control is rather doubtful. Penetration of sprays through the compact heads preferred by this pest is difficult to achieve

Sorghum head caterpillar *Cryptoblabes adoceta*	Larvae: brownish green in colour with a darker line on each side of the back. Up to 10 mm long. Moths: forewings dark-grey, broken by lighter and darker markings. Hind wings light grey and fringed with fine hairs. Wingspread 15 mm	Feed on the grain and foul the heads with webbing and excrement	Trichlorphon 700 g/ha Endosulfan 750 g/ha	Infestations in the compact heads preferred by this pest are difficult to control. Attempts at controlling populations less than 15 larvae per head may be uneconomic. If large numbers of moths or small larvae are present at flowering, the use of monocrotophos for midge control could, in addition, provide early control of head caterpillar. TRICHLORPHON SHOULD NOT BE USED ON ALPHA AND PIONEER 846 SORGHUM VARIETIES

The commercial product names listed below are examples of the particular insecticide available and should not be construed to indicate recommendation of a particular company's product in preference to another which may have been inadvertently omitted.

Common name	Commercial name	Dosage		
		Active constituent	Commercial product	
				Strength of product
carbaryl	Hi-Kil Bugmaster Zevilon, Septene	550–700 g/ha	700–875 g/ha	80% w/w
diazinon	Gesapon	550–700 g/ha 300 g/ha	700–875 ml/ha 375 ml/ha	80% w/v
endosulfan	Thiodan, Endosan	750 g/ha	2·1 l/ha	35% w/v
fenitrothion	Sumithion Technical, Folithion 57	425 g/ha	430 g/ha 750 ml/ha	98% w/w, 57% w/v
lindane		— 1 g/200 m	150 g/50 kg seed 1 g/40 m 1 g/160 m 1 ml/32 m	20% w/w 20% w/w 80% w/w 16% w/v
maldison	Malathion, Malapreme, Pre-Mal 103 Malathion ULV Pre-Mal 118 ULV	425–700 g/ha 550 g/ha	410–680 ml/ha 360–590 ml/ha 450 ml/ha	103% w/v 118% w/v 118% w/v
monocrotophos	Nuvacron, Azodrin	275–550 g/ha 200 g/ha	700–1 400 ml/ha 500 ml/ha	40% w/v 40% w/v
naled	Dibrom	300–450 g/ha	330–500 ml/ha	90% w/v
trichlorphon	Dipterax Klorfon	550–700 g/ha	700–875 g/ha 925–1 175 ml/ha	80% w/w 60% w/v

Commercial nanes which include the common names are not shown.

Insecticides and sorghum varieties

It has been noted that the application of certain insecticides to some sorghum varieties has had harmful effects on the crop. The effect of trichlorphon on a number of varieties has been studied and the results are shown as a guide to insecticide-variety relationships.

0—No damage from trichlorphon

Pacific 007, Goldfinger, DeKalb A25, DeKalb E57, DeKalb F64a, NK 133, NK 207, NK 220Y, NK 233, NK 266, Te 33, Dorado E.

A trace of damage

Q5161, DeKalb C42Y.

1—Slight damage as spotting on the leaves

DeKalb C42, NK 212, Nanja 370.

2—Leaf scorching evident

Texas 610, Texas 610 SR, Texas 626, DeKalb E55e, NK 275, Tetell, Te Grainmaster, Rico.

3—Most severe damage, may affect grain head and stem

Alpha, Pioneer 846.

Other insecticides showing similar reactions with sorghum include methyl parathion, fenitrothion and monocrotophos.

Insecticides that have not shown these reactions in the Department's tests include methomyl, chlorfenvinphos, chlorpyrifos, diazinon, carbaryl, maldison, methidathion and endosulphan. It should be noted, however, that not all of these are recommended for pest control in sorghum.

The sorghum plants are more susceptible to damage at later stages of growth and may not be damaged by applications before the shot blade stage.

Fines for dealing in native birds

FINES for advertising fauna for sale without authority ranged from a minimum of $200 to a maximum of $3 000, the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.) said recently.

In addition, there was a $10 penalty for each fauna for which the offence was committed.

However, permission was not needed to advertise or sell aviary birds, such as canaries or foreign finches.

Mr. Sullivan said that an upsurge in the advertising of native birds for sale had occurred since recent legislation had introduced the concept of aviary birds.

'The intention of declaring certain species as aviary birds was to help the average bird-keeper', he stated.

'In return, people should ensure that they become familiar with declared aviary species and do not advertise or sell other species without a permit.

'The relevant legislation was introduced on 1 September this year and that should have given people interested sufficient time to become familiar with the new laws'.

Mr. Sullivan reminded those who were keeping permanently-protected or protected fauna that the expiry date for declaration, or application, to keep such species was 31 October 1974.

Terms used in pig condemnations

PRODUCERS do not always have a precise idea of the meaning of some of the more common terms used in the condemnation of pig carcasses and part carcasses. These are explained in this article.

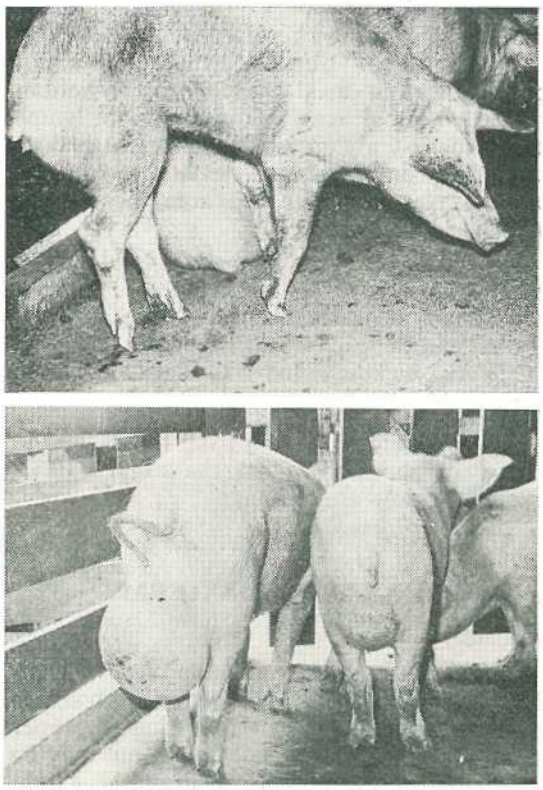
However, to understand these explanations, it is necessary to know the meaning of the following words:—

INFLAMMATION. Inflammation is the normal reaction of living tissues to an injury in an attempt to heal the injury. Inflamed tissues are hot, swollen, painful, red and have a loss of function. But all these signs are not seen in all cases. A sprained ankle in man may show all these signs. Words ending in -itis refer to inflammation of a particular organ, for example mast*itis* and enter*itis*, inflammation of the mammary gland(s) and intestines respectively.

Inflammation is not always associated with infection, as in the case of a sprained ankle. This will be explained later.

INFECTION. Infection can be defined as the invasion of the body or part of the body by disease-causing micro-organisms (bacteria, viruses, mycoplasma, fungi or other organisms).

ACUTE means of recent onset and generally a short, sharp course. When an infection or inflammation first occurs, it is generally more intense or acute. As time passes, the intensity of the condition generally declines and the affected area returns to normal. However, in some circumstances the condition may become chronic. Occasionally conditions can maintain their intensity and persist as acute for 2 weeks or more.



TOP. Arthritis. Typical posture adopted by pigs affected with arthritis. This gilt was totally condemned.

BOTTOM. Ulcerative granulomas. Faulty castration leads to such infected wounds.

by W. R. Webster, Veterinary Officer

CHRONIC means having been in existence for a longer time and with a less intense reaction. Conditions that have persisted for longer than, say, 10 days are generally chronic.

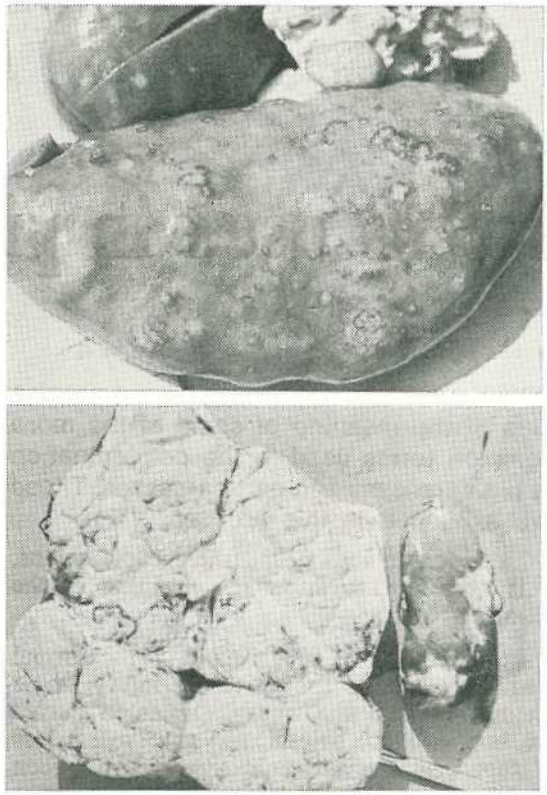
ADHESIONS sometimes form when certain organs are inflamed. Adhesion means joining together of tissues and is frequently seen in cases of peritonitis and of pneumonia with pleurisy.

LYMPH NODES (lymph glands) are small structures throughout the body that have an important role in the local body defence mechanism against infection.

Each lymph node receives body fluid from a specific area. Certain lymph nodes are routinely cut at meat inspection. Deviations from the normal healthy appearance in lymph nodes suggest abnormalities in the structures that they drain. Such deviations warrant further investigation in the area the affected lymph node drains.

We often say when we have a cold or 'flu' that 'the glands in my neck are up'. This, in fact, is an enlargement of the lymph nodes of the head in response to the infection. Lymphadenitis means inflammation of a lymph node or nodes.

A LESION is a deviation from the normal in a part of the body. All the abnormalities described below are lesions.



TOP. Nephritis. This kidney is typical of leptospirosis infection.
BOTTOM. Cancer of the kidney. One kidney is almost unrecognizable; the other is partly affected.

CONDEMNATION TERMS

Abscess

An abscess is an accumulation of pus, generally at a chronic site of infection. Abscesses are most commonly seen following improper injections or in cases of tail biting, but may be due to one of many other causes.

Arthritis and polyarthritis

Arthritis is the inflammation of one joint; polyarthritis involves two or more joints. A typical case of arthritis is illustrated on page 483. Many cases of arthritis are detected at meat inspection in pigs apparently sound when sent for slaughter. In these cases, changes have been seen in the lymph nodes associated with a joint. When opened, these joints then show the signs of arthritis.

The disease erysipelas is often associated with a high incidence of arthritis.

Septicaemia

Septicaemia is a generalized infection in which micro-organisms are present in the blood stream. A pig with an infection that is not localized to one area but is throughout the body is suffering from septicaemia.

Fever

Fever means an elevated body temperature that is again often due to a generalized infection. Therefore fever and septicaemia are difficult to distinguish and are generally seen together.

Examples of conditions that would cause condemnations due to septicaemia and/or fever are acute erysipelas and acute enzootic pneumonia (formerly called virus pneumonia).

The stress of transportation can cause a flare up of pneumonia in a pig that was apparently normal when it left the property. The flare up can be serious enough to cause a septicaemia, in which case the whole carcass would be condemned.

Pigs that die of heatstroke are fevered but do not suffer from septicaemia.

Multiple abscess

Pyaemia or multiple abscess occurs as a result of pus-producing bacteria circulating in the blood stream. These can result in multiple small abscesses throughout the body. Compare this condition with septicaemia, which is non pus-producing.

Dermatitis

Dermatitis is inflammation of the skin. This is commonly caused by parasitic mites (sarcoptic or demodectic mange) but can be due to other causes.

Pleurisy

Pleurisy is an inflammation of the outside of the lungs and the lining of the chest cavity causing adhesions between the lungs and the inside chest wall. Pigs with pleurisy generally also suffer from pneumonia.

Peritonitis

Peritonitis is an inflammation of the lining of the abdominal cavity and the surface of organs within the body cavity. A perforated ulcer leads to peritonitis when the gut wall is no longer intact. There is seepage from inside the gut into the body cavity and adhesions may form.

Pericarditis

Pericarditis is inflammation of the sac that encloses the heart.

Glasser's Disease is a common cause of pleurisy, peritonitis and pericarditis in pigs. Affected pigs also often suffer from polyarthritis.

Septic wounds

Wounds that have become infected with bacteria are known as septic wounds. Septic wounds sometimes develop into abscesses. Septic wounds often occur after pigs have been fighting.

Ulcerative granuloma

Spirochaetosis or ulcerative granuloma is a specific form of septic wound that frequently produces large infected areas. (See illustration on page 483).

Castration wounds are most frequently infected but ulcerative granulomas are seen on other parts of the body. The condition is more common in piggeries with poor hygiene.

Fractures

The meaning of fractures or broken bones needs no explanation but it is worth stressing that faulty diet, especially a deficiency or imbalance of calcium, phosphorus or vitamin D may produce bones that are more liable to break.

Bruising

Again bruising needs no explanation but it is worth emphasizing that bruising causes a substantial monetary loss to the pig industry. Quiet handling and well designed yards, races and transport facilities can reduce this loss significantly.

Emaciation

Emaciation means that the animal is in abnormally poor condition or is abnormally thin. Emaciation results in total condemnation of a carcass.

Melioidosis

Melioidosis is a condition caused by a specific bacteria. Abscesses are present in lymph nodes and internal organs. This disease is important as it also occurs in man. It is seen mainly in northern Queensland.

Sparganosis

A parasitic condition seen mainly in wild pigs is known as sparganosis. It can be transmitted to man if he eats affected meat. For this reason, it is risky to eat uninspected feral pigs.

Tuberculosis

Tuberculosis is another disease caused by specific bacteria that is infectious to man. The incidence of tuberculosis has decreased markedly as a result of the lower incidence of the disease in dairy cattle and the less frequent feeding of pigs on milk products.

Atypical or Battey tuberculosis is a different form of tuberculosis with no relationship to tuberculosis in cattle.

Metritis

Metritis is inflammation of the uterus and is generally seen after farrowing. Localized peritonitis and septicaemia sometimes accompany metritis resulting in partial or complete condemnation.

Nephritis

Nephritis is inflammation of the kidney. This is commonly caused by leptospirosis. (See illustration on page 484).

Pyelonephritis

Pyelonephritis is inflammation of the pelvis or 'core' of the kidney. This is generally a chronic accumulation of pus.

Pigs affected with kidney worm commonly suffer from pyelonephritis.

Cancer

Cancer of the kidney is occasionally seen in pigs. Affected carcasses are totally condemned. (See illustration on page 484).

Grasshopper control assistance

PROVISION of financial assistance for grasshopper plague control measures in agricultural and pastoral areas of Queensland will be continued by the State Government beyond 30 September this year.

Announcing this, the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.), said that the assistance scheme, designed to help prevent a major outbreak this summer by keeping breeding to a minimum, was to have terminated on 30 September.

The Government considered that the period should be extended and the progress of the scheme is reviewed at regular intervals.

'I announced last month that the Government would refund to Plague Grasshopper Destruction Committees half the actual cost of insecticides used in grasshopper control in declared districts', Mr. Sullivan said.

'For the campaign to be successful, the full co-operation of landholders involved will be required in initiating urgent control measures to ensure that breeding is kept to a minimum.'

Mr. Sullivan said that swarms of the spur-throated variety were already presenting a threat to rural production in southern and south-western areas of the State.

In Central Queensland, egg populations of the migratory locust were still hatching. These developments highlighted the need for prompt action by farmers to avert resurgence of the pest in plague proportions later this year, the Minister added.

Soybean varieties for next season

by Agriculture Branch Officers.

SOYBEAN varieties recommended for planting in Queensland in the 1974-75 season are listed below.

Varieties of soybeans need to be carefully selected, and new growers are advised to choose varieties only from those listed in the tables as recommendations for their districts.

December is the main planting time for soybeans, and the crop has critical requirements for cultivation, nutrition, pest control and moisture supply.

Planting rates should be increased with later plantings. Under irrigation on the Darling Downs, only the Hill variety should be sown in very early or very late plantings. Semstar is highly susceptible to bacterial pustule and wild fire and this variety should be avoided where possible. Semstar should not be planted in any tobacco-growing district.

District	Planting time	Varieties	Planting rate plants/hectare
Far North			
Mareeba–Atherton*	Dec.–Jan.	Ross, Daintree, Improved Pelican	250 000–300 000
Burdekin		IRRIGATED	
Ayr, Millaroo, Bowen	Dec.–mid Jan.	Gilbert Improved Pelican	250 000–300 000
Central Highlands		IRRIGATED	
Emerald	Late Nov.–mid Dec.	Gilbert, Daintree	125 000
	Mid Dec.–mid Jan.	Wills, Davis	300 000–375 000
	After mid Jan.	Davis (only)	375 000–500 000
Callide–Dawson		IRRIGATED	
Biloela	Dec.–early Jan.	Davis, Wills. (*For trial:* Hampton, Bragg)	250 000–300 000
	Dec.–early Jan.	RAIN-GROWN Davis, Wills (*For trial:* Hampton, Bragg)	200 000–250 000
BURNETT REGION			
North Burnett			
Monto–Eidsvold*	Dec.–early Jan.	Bragg, Davis, Wills	250 000–300 000
Central Burnett			
Gayndah, Biggenden, Mundubbera*	Dec.–early Jan.	Wills *For Trial:* Davis, Bragg, Hampton	250 000–300 000
Coastal Area			
Bundaberg, Maryborough*	Dec.–early Jan.	Wills	250 000–300 000

* Recommendations based on 1972–73 information.

District	Planting time	Varieties	Planting rate plants/hectare
South Burnett			
Goomeri, Kingaroy, Murgon, Nanango, North Rosalie	Late Nov.–early Jan.	Bragg, Davis, Hill, Hampton, Semstar	250 000–300 000
Near North Coast			
Gympie, Cooroy, Kilkivan, Eumundi, Pomona	N.A.	N.A.	N.A.
West Moreton			
Lockyer, Brisbane and Fassifern Valleys, Beaudesert	Dec.–early Jan.	IRRIGATED Davis, Bragg, Hampton, Wills, Hill	300 000–400 000
		RAIN-GROWN	
	Nov.–early Jan.	Bragg, Davis	250 000–300 000
	Nov.	Hill	300 000–350 000
	Late January	Hill	350 000–400 000
DARLING DOWNS			
Northern Downs			
Wambo	Nov.–Dec.	IRRIGATED Davis, Bragg, Wills, Hampton	300 000–400 000
		RAIN-GROWN	
	Late Nov.–early Jan.	Semstar, Hill	150 000–200 000
Central Downs			
Jondaryan, Pittsworth, Millmerran, Rosalie, Crow's Nest	Nov.–Dec.	IRRIGATED Davis, Bragg, Hampton, Hill	300 000–450 000
		RAIN-GROWN	
	Nov.–Dec.	Hill	200 000–300 000
Southern Downs			
Clifton, Cambooya, Allora, Glengallan	Nov.–Dec.	IRRIGATED Davis, Bragg, Hill	300 000–450 000
		RAIN-GROWN	
	Nov.–Dec.	Hill	200 000–300 000
Granite Belt		RAIN-GROWN	
	Nov.–Dec.	Hill	200 000–300 000
Border Region		IRRIGATED	
Inglewood	Late Nov.–early Jan.	Davis, Bragg, Hill, Hampton	300 000–400 000
St. George		IRRIGATED	
	Dec.–early Jan.	Hampton, Davis, Bragg, Wills	300 000–400 000

N.A. Not available.

Marketing Queensland's tobacco

ALL tobacco leaf grown in Queensland is required to be marketed through The Tobacco Leaf Marketing Board. The Board also acts as agent for The Tobacco Leaf Marketing Board of New South Wales.

The Board is a marketing authority constituted under the Primary Producers' Organisation and Marketing Act 1926–1973.

The Tobacco Leaf Marketing Board was constituted on 22 July 1948 and has operated continuously since that date. The present life of the Board extends until 31 December 1978. The Board consists of eight grower members elected by tobacco growers every 3 years and the Director of Marketing.

Before the Board took over marketing Queensland tobacco leaf in September 1948, all leaf produced in Australia was marketed through The Australian Tobacco Board which was set up as a wartime measure under the National Security Regulations.

The Tobacco Leaf Marketing Board does not itself handle the commodity, but has appointed two agents, the North Queensland Tobacco Growers' Co-operative Association Limited and The South Queensland Tobacco Growers' Co-operative Association Limited, to carry out the physical handling and auction of the leaf on its behalf.

These agents also own the floors on which tobacco leaf is displayed for sale. However, the Board retains the right to determine where any new display floors shall be erected and also approves the type of floor that may be built.

by J. L. BELL, Marketing Officer.

Voting

For the election of grower members to The Tobacco Leaf Marketing Board, the State is divided into districts. Members are elected on the following basis:—

1. District No. 1, comprising all that part of Queensland lying to the north of the Tropic of Capricorn, 4 representatives
2. District No. 2, comprising all that part of Queensland lying to the west of the Great Dividing Range and to the south of the Tropic of Capricorn, 2 representatives.
3. One representative from each of the following districts:—

District No. 3, comprising all that part of Queensland bounded on the north by the Tropic of Capricorn, on the south by the northern boundaries of the Shires of Widgee and Kilkivan and on the west by the Great Dividing Range.

District No. 4, comprising all that part of Queensland lying east of the Great Dividing Range and to the south of District No. 3.

A grower entitled to vote at elections and referendums must have the following qualifications:—

a. At the time of the election he must be either—

(i) The holder of a grower's basic quota under and pursuant to the provisions of the Tobacco Industry Stabilisation Act 1965–1972.

(ii) A sharefarmer who, at the time of voting, has an agreement or an arrangement with a quota holder and who has grown or is growing tobacco within 12 months ended 60 days before the date of the poll.

b. He must be over 18 years of age and be enrolled on the Electoral Roll for an electoral district for Queensland State elections.

c. In a partnership, only one vote may be recorded for each partnership and this vote must be cast in the name of the partnership and not in the name of any individual member of the partnership.

d. In a company, only one vote may be recorded for the company and this vote must be cast in the name of the company by a person authorised to act for the company.

A grower must vote for the district in which the tobacco leaf was grown or, if he has grown in more than one district, he must vote for the district in which he has the greatest area of tobacco.

Stabilization

Stabilization began on an interim basis for the 1965 selling season following agreement between the Commonwealth Government and the government of the producing States.

The basis of the stabilization arrangements is provided in complementary Commonwealth and State legislation—Queensland: Tobacco Industry Stabilization Act 1965–1972. New South Wales: "Tobacco Leaf Stabilisation Act, 1967". Victoria: Tobacco Leaf Industry Stabilization Act 1966. Commonwealth: Tobacco Marketing Act 1965–1966.

This legislation gives power over the marketing of Australian tobacco leaf to the Australian Tobacco Board.

The original stabilization plan was for a period of 4 years, concluding at the end of the 1968 selling season. This was later extended for a further 5 years, concluding with the end of the 1973 selling season. With the agreement of the State and Commonwealth Governments, the plan, with certain changes, was continued for a further 5 years, beginning with the 1974 selling season.

The current arrangements are:—

a. The Australian Tobacco Board to administer the plan.

b. A marketing quota for Australian tobacco leaf will be guaranteed for each of the 5 years and this will be determined from year to year in accordance with the provisions of the next paragraph.

c. The marketing quota for 1974 is 15 422 000 kg (green weight) flue-cured leaf, and the marketing quota for each subsequent selling season will be determined and announced as early as practicable in the preceding year on the basis of a recommendation by the Australian Tobacco Board to the Australian Agricultural Council.

d. The Australian Tobacco Board, in making its recommendation on each annual marketing quota, will take into account consumption trends, stockholdings, possible shortfalls in supply of the Australian marketing quota in the year preceding that for which the quota is recommended.

e. Each year's Australian annual marketing quota is to be divided between the tobacco producing States according to a formula approved by the Australian Agricultural Council.

f. State quotas will be translated into quotas for individual growers in each State by the respective State Quota Committee.

g. Leaf which falls within the official grade and minimum price schedule up to the marketing quota will be offered for sale by auction in Australia by the State marketing boards. This is known as marketing quota leaf.

h. Policies applying to the sale of non-quota (over-quota and out-of-quota) leaf are to be determined by the Australian Tobacco Board.

i. All sales of leaf in Australia will take place under an official grade and minimum price schedule constructed by the Australian Tobacco Board and designed to yield a stipulated average minimum price, currently 288.4c per kg based on the fall-out of grades of crops from the 1965 to 1969 seasons.

j. In the event that agreement cannot be reached among the parties on the grade of any leaf offered for sale, the decision of the Australian Tobacco Board's arbitrator will be final.

k. Arrangements will be made for financial accommodation to be available to manufacturers sufficient to ensure continuing competition by manufacturers in the auction sales for each full annual marketing quota of Australian tobacco leaf, and to enable them to carry stocks at a reasonable cost.

Table 1 sets out the annual Australian marketing quota since the 1965 selling season when the first stabilization plan commenced.

The Australian Tobacco Board

Under the Tobacco Marketing Act 1965–1966, the Australian Tobacco Board was established with a membership of 12: one member representing the Commonwealth, who is the Chairman of the Board; three members representing the State Governments of Queensland, New South Wales and Victoria; three

TABLE 1

TOBACCO LEAF: Distribution of the Australian Marketing Quota between the producing States

tonnes (green weight)

——	Queensland	New South Wales	Victoria	Australia
1964–65 ..	6 350·3	1 060·5	4 382·6	11 793·4
1965–66 ..	6 350·3	1 060·5	4 382·6	11 793·4
1966–67 ..	6 350·3	1 060·5	4 382·6	11 793·4
1967–68 ..	6 350·3	1 060·5	4 382·6	11 793·4
1968–69 ..	6 960·8	1 162·6	4 804·0	12 927·4
Supplementary Quota (*a*)	861·8	90·7	272·2	1 224·7
1969–70 ..	7 815·4	1 305·4	5 394·1	14 514·9
1970–71 ..	8 304·4	1 386·6	5 731·2	15 422·2
Temporary Quota (*b*)	244·0	40·8	168·8	453·6
1971–72 ..	8 304·4	1 386·6	5 731·2	15 422·2
1972–73 ..	8 304·4	1 386·6	5 731·2	15 422·2
1973–74 ..	8 304·3	1 386·6	5 731·1	15 422·0

(*a*) Supplementary allocation to maintain an agreed desirable level of stocks held by manufacturers.

(*b*) 1970–71 season only.

(SOURCE: Australian Tobacco Board)

members representing tobacco growers in the States of Queensland, New South Wales and Victoria; one member representing tobacco growers generally; four members representing tobacco manufacturers.

Each member of the Board has an appointed deputy who attends meetings in the member's absence.

Tobacco Quota Committee

The Tobacco Quota Committee constituted under the Tobacco Industry Stabilisation Act 1965–1972 is responsible for the allocation of quotas to tobacco growers and the determination of the quantities to be called up for sale. The Committee, which is appointed for 3 years, consists of a representative of the Department of Primary Industries, who is Chairman, and three representatives of tobacco producers who are nominated by the Board from its elected members.

A grower who is dissatisfied with any decision of the Quota Committee has the right of appeal to the Tobacco Quota Appeals Tribunal. The only allowable grounds of appeal are that the decision of the Committee was not in accordance with the Act; was manifestly unfair; would cause severe personal hardship to the appellant.

The Tobacco Quota Appeals Tribunal consists of three members: a barrister-at-law, a Stipendiary Magistrate, or a person who has been a Stipendiary Magistrate, who is the Chairman; a person nominated by the Minister, who shall be well versed in matters relating to the tobacco industry and who shall not directly or indirectly by himself or his partner or partners have any pecuniary interest in the production, sale or manufacture of tobacco leaf; a person selected by the Minister from a panel of three persons nominated by the State Board.

Crop Returns

Under the Primary Producers' Organisation and Marketing Act, a marketing board can require growers to furnish returns showing the quantity of the crop and such other information as may be required from time to time. Tobacco growers in North Queensland are required to submit these returns by 1 November each year, while growers in South Queensland are required to furnish their returns by 31 December each year, except that Miriam Vale growers are required to furnish their returns by 15 January.

Sales Procedure

Queensland tobacco leaf is sold by auction at sales held in Mareeba and Brisbane. There are usually five sales per year in Mareeba and four in Brisbane. Growers deliver their leaf to these centres on instructions from the Board.

Each quota holder is allotted at least one crop number each year. Crop numbers are issued by the Board in random order, usually in the order that the Board receives the annual crop returns from growers. These numbers are made available only to the person or persons growing the crop and to the Board's selling agents.

Before each series of sales, each holder of a crop number is advised of the number of bales he may deliver for that series. In North Queensland, he is also advised on which day he can deliver the leaf.

On delivery to the sales floor, the leaf is weighed by the Board's selling agents. The maximum bale weight allowed is 90 kg and the minimum weight is 30 kg. Bales which fall outside these limits are rehandled at the grower's expense. Bales are set up on the

sales floor in the order in which they are received and code numbers are the only identification marks allowed.

On the day of the sale, leaf is appraised by the Board's appraisers and a grade and minimum price are placed on the bale ticket. This ticket also records the crop number and the inward weight of the bale.

The leaf is sold by auction and all leaf falling within quota grades in terms of the Minimum Price and Grade Schedule must be taken up by the manufacturers during the course of the selling season. If the price bid by the manufacturer is equal to or exceeds the price placed on the bale by the Board's appraisers, that is, the reserve price, the crop is sold to the highest bidder. If the bid falls short of the reserve price, the last bidder nominates the grade which he considers the leaf to be, and this bale goes to arbitration.

The Australian Tobacco Board employs an arbitrator who, without reference to the bale ticket, determines the grade of any leaf in dispute. The decision of the arbitrator is final and the manufacturer who was the last to bid on the bale can either accept it at the arbitration price or the bale goes into 'hold'. This arbitration price may be lower, the same, or higher than the original reserve price. If no bid is received for a bale, the arbitrator is required to determine the final price for the leaf and the bale is then put into 'hold'.

Leaf that goes into 'hold' must be taken up by the manufacturer before the end of the selling season. The various authorities concerned ensure that each manufacturer buys his correct percentage of Australian leaf.

Leaf which falls outside the Minimum Price and Grade Schedule is non-quota and may be taken up by manufacturers during the sales depending on their requirements.

At the end of the 1969, 1970, 1971 and 1972 selling seasons, quantities of non-quota leaf were sold for export at an average of 66c per kg. Total sales of tobacco leaf by sales floor for Queensland and New South Wales since 1967–68 are shown in Table 2.

After each day's sale, bales are sorted into lots according to the purchaser and consigned to the purchasing firm's re-drying plants.

Re-drying plants are located in Brisbane and Melbourne, but manufacturing is concentrated in Sydney and Melbourne.

TABLE 2

TOBACCO LEAF: Sales by The Tobacco Leaf Marketing Board

Crop	North Queensland			South Queensland			Total Queensland			New South Wales		
	Quantity	Total Realizations	Average per kg	Quantity	Total Realizations	Average per kg	Quantity	Total Realizations	Average per kg	Quantity	Total Realizations	Average per kg
	kg	$	c	kg	$	c	kg	$	c	kg	$	c
1967–68	5 515 281	14 261 098	258·6	1 366 284	3 436 899	251·6	6 881 564	17 697 997	257·2	939 031	2 340 746	249·3
1968–69	7 311 867	18 143 276	248·1	1 840 538	3 984 591	216·5	9 152 404	22 127 867	241·8	1 126 961	2 816 068	249·9
1969–70	6 287 552	16 153 432	256·9	1 633 176	4 006 910	245·3	7 920 728	20 160 342	254·5	1 388 966	3 437 168	247·5
1970–71	7 182 624	18 703 591	260·4	1 499 855	3 746 960	249·8	8 682 480	22 450 551	258·6	1 260 184	3 146 751	249·7
1971–72	6 627 267	17 033 925	257·0	1 741 463	4 343 869	249·4	8 368 730	21 377 794	255·5	1 400 537	3 608 288	257·6
1972–73	6 646 770	16 879 257	253·9	1 728 670	4 036 691	233·5	8 375 440	20 915 948	249·7	1 401 330	3 388 436	241·8

(SOURCE: The Tobacco Leaf Marketing Board)

Payments to Growers

As stated earlier, unlike with a number of other commodities, tobacco is not sold on a pool system, but on an individual bale system. This is the reason for showing crop numbers on each bale. The Tobacco Leaf Marketing Board is required to pay each grower the actual worth of his leaf less costs necessarily incurred in the marketing of his crop.

Deductions for the 1973–74 selling season are:

Board administration	2·00c per kg
Agents commission—N. Qld.	2·25%
—S. Qld.	2·50%
Warehouse charges	0·45c per kg
Research levy	1·10c per kg
Insurance	0·50%

Imports

Australia imports just under 45% of her annual requirements of tobacco leaf with over 50% coming from the U.S.A. Australian imports since 1964–65 are shown in Table 4.

All imported tobacco is subject to import duty. The present rate of duty on unmanufactured tobacco for use in the production of cigarettes or fine cut tobacco that contains Australian produced leaf as prescribed by law is $1.1775 per kg. On leaf from Malawi and Zambia the duty is $1.0205 per kg.

TABLE 3

TOBACCO LEAF: Statutory Percentage of Australian Leaf Required to be Incorporated in Domestic Manufactured Blends as a Condition for Paying Concessional Rate of Duty on Imported Leaf Incorporated in Such Blends

%

Date of Change	Cigarettes	Cut Tobacco
23–5–36	2·5	13·0
1–10–38	3·0	15·0
15–11–46	3·0	5·0
1–1–53	4·5	7·5
1–4–53	6·0	10·0
1–7–54	6·0	12·5
1–7–55	7·5	17·5
1–7–57	12·5	21·0
1–7–58	15·5	16·5
1–7–59	22·0	23·5
1–7–60	28·5	24·5
1–7–61	35·0	32·0
1–7–62	43·0	40·0
12–9–62	40·0	37·0
1–7–63	40·0	40·0
1–7–64	41·5	41·5
1–4–65	43·0	43·0
1–7–65	45·0	45·0
1–10–65	47·0	47·0
1–1–66	50·0	50·0

(SOURCE: Department of Customs and Excise)

TABLE 4

TOBACCO LEAF: Imports of Unmanufactured Tobacco Leaf into Australia by Country of Origin: 1968–69 to 1972–73 kg

Country	1968–69	1969–70	1970–71	1971–72	1972–73
Brazil	15 634	3 141	157 899	255 151	217 397
Canada	343	7	..	..	..
China	49 932	..	208 258	144 203	178 498
Taiwan	66 952	167 927	49 813	45 058	..
Fiji	177 966	32 327	18 827	49 824	5 151
Greece	752 062	1 447 274	857 599	1 226 647	721 927
India	84 873	133 545	204 731	111 078	74 971
Indonesia	47 416	72 381	72 504	12 035	48 943
Korea (Republic of)	1 248 514	1 053 358	1 202 971	1 274 818	587 281
Malawi	216 966	483 955	495 809	562 508	655 628
Mozambique	8	166 850	122 757	52 237	178 310
Philippines	56 249	41 517	864 314	680 920	440 005
South Africa	1 166 420	1 487 388	1 272 236	589 153	400 387
Thailand	348 716	867 721	703 707	666 613	294 817
Turkey	262 366	158 422	208 693	168 955	172 693
U.S.A.	8 697 824	8 693 951	6 902 855	6 212 741	6 199 215
Zambia	38 347	47 477	63 707	57 811	44 376
Others	11 187	75 506	77 838	101 136	75 435
Total	13 241 775	14 982 747	13 484 518	12 210 888	10 295 034

(SOURCE: Bureau of Census and Statistics)

A manufacturer who is the holder of a certificate issued by the Minister for Customs and Excise is permitted to import unmanufactured tobacco at concessional rates of duty. A certificate is issued on the following conditions:

- The imported unmanufactured tobacco leaf is to be locally manufactured into cigarettes or tobacco containing not less than 50% of Australian leaf.
- The certificate holder must purchase his annual requirements of Australian leaf from each year's auctions of quota leaf.
- The manufacturer is to maintain stocks of Australian leaf equivalent to 18 months' usage.

Manufacturers are now using slightly more than 55% of Australian leaf in tobacco products for local consumption. Statutory percentages of Australian leaf to be incorported in domestic manufactured blends since 1936 are shown in Table 3.

Production statistics of cigarettes and manufactured tobaccos are shown in Table 5.

TABLE 5

AUSTRALIA: Production of Cigarettes and Tobacco

Year	Cigarettes Produced	Tobacco Produced
	m.	m.kg
1958–59	15,622·2	7·67
1959–60	16,994·5	6·89
1960–61	18,513·0	6·89
1961–62	18,573·4	5·81
1962–63	19,656·8	5·22
1963–64	20,002·0	4·63
1964–65	21,767·7	4·13
1965–66	21,333·2	3·81
1966–67	22,585·7	3·45
1967–68	23,334·7	3·31
1968–69	25,188·0	3·31
1969–70	27,061·0	3·04
1970–71	27,931·2	3·08
1971–72	27,065·0	2·94

(SOURCE: Department of Customs and Excise)

Swine disease study unit

THE State Government has approved allocation of a further $8 000 to meet construction costs of the swine disease study unit at the Animal Research Institute, Yeerongpilly, Brisbane, operated by the Department of Primary Industries.

The Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.) said the experimental unit was expected to cost $64 000 now, due to increases in building costs since the project was first approved in 1973.

The original estimate for erection of the unit, which would provide housing for a small breeding section and include facilities for disease studies with growing pigs, was $56 000.

Mr. Sullivan said that the project was being financed from the Swine Compensation Fund.

Under the Swine Compensation Fund Act 1962–1969, the use of funds for the control, eradication or prevention of disease in swine was permitted, he added.

Duboisia growing

by A. R. CARR,
Horticulture Branch.

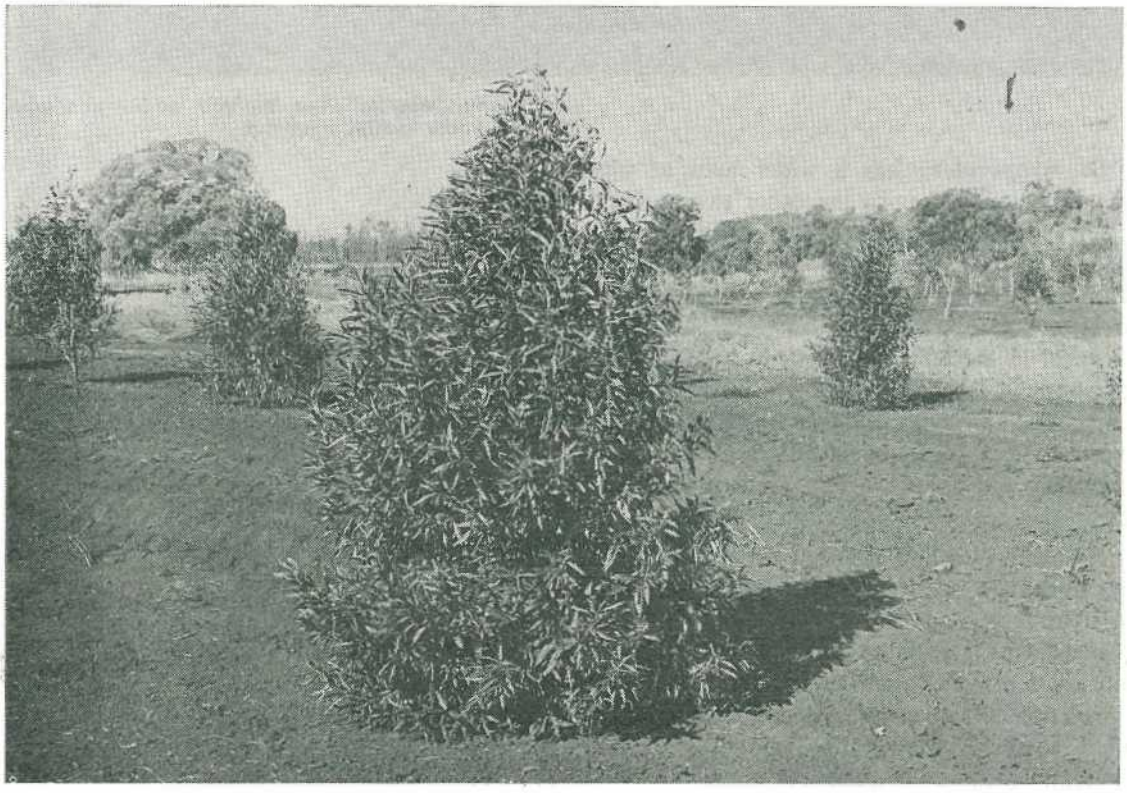
THE genus *Duboisia,* represented by three species, is a valuable source of drugs, the most important of which are scopolamine (hyoscine) and hyoscyamine.

In Queensland only two species, *D. myoporoides* and *D. leichhardtii,* are harvested for their leaf. Commercial production is limited almost entirely to the South Burnett area where *D. leichhardtii* is the prominent species. The third species, *D. hopwoodii,* is not grown commercially.

The genus is represented by typically small trees which are peach-like in appearance. However, the leaves and corky bark of Duboisia have a thicker texture than those of the peach.

The two main species are easily identified by their flower structure. The flowers of *D. myoporoides* have rounded petals. The petals of *D. leichhardtii* flowers are pointed. The fruit of both species are small, black berries that mature in early summer and contain from six to 12 seeds.

A suitable type of tree for seed selection. Growers saving seed are advised to select trees of this type that have a dense cover of broad, heavy leaves.



Young Duboisia trees planted on the contour and under clean cultivation.

D. myoporoides has a wider area of distribution than either of the other two species. It grows in a wide range of climatic conditions extending from New Caledonia, throughout coastal Queensland to as far south as Gosford in New South Wales. *D. leichhardtii* is most plentiful in the South Burnett, but is found as far south as Acacia Plateau and in the west at Chinchilla. *D. hopwoodii* is found mainly in Western Australia but occurs also in South Australia and south-western Queensland to a lesser degree.

Research into Duboisia has been carried out by both the Commonwealth Scientific and Industrial Research Organization and the Queensland Department of Primary Industries. Information from this research, combined with knowledge of proven practices, has been compiled to help growers to adopt the most economic methods of production.

Economic importance

The industry, during the 1971-72 season, produced 914 tonnes (900 tons) of dried leaf valued at $1 000 per ton. This amount was produced by approximately 250 farmers. Production in the 1972–73 season fell by about 50·8 to 71 tonnes (50 to 70 tons) because growers had difficulty obtaining labour and also because of the higher prices for grain and beef. It is expected that production will decline further in the current season by an estimated 152 tonnes (150 tons).

The bulk of the production comes from the smaller grower, with about only 10 growers planting more than 30 hectares (75 ac.) a year.

Cost of production reached approximately $67.7 per hectare ($25 per ac.) during the 1972-73 season. Average gross income from

24 ha (60 ac.) of producing trees plus 6 ha (15 ac.) of replacement trees has been estimated at approximately $272 per ha ($110 per ac.). A higher gross return on a per hectare basis is usually obtained by the smaller grower who can afford more time for all cultural practices.

Rainfall and climate

D. leichhardtii is the species most widely cultivated in Queensland. It grows naturally in the cooler, drier climate of the Burnett region. The average annual rainfall in this area is 760 mm (30 in.). The heaviest falls occur during the summer months.

Topography and soil type

D. leichhardtii grows naturally on a wide range of soils from the heavy, red clay soils to heavy, dark-brown forest loams, to the red and red-brown sandy loams. Duboisia is grown commercially on the red-brown sandy loams which occur on the higher ridges of the Kingaroy-Proston area. These have a pH range from 4·5 to 5·5, and are generally low in calcium and phosphorus.

D. myoporoides grows naturally on a wide range of soils and is found along the coastal regions of Queensland and northern New South Wales. Soil types in these regions vary from volcanic loams on the mountain plateaus to sandy loams on the rising foothills, to heavy clay loams on some of the river valleys and flats.

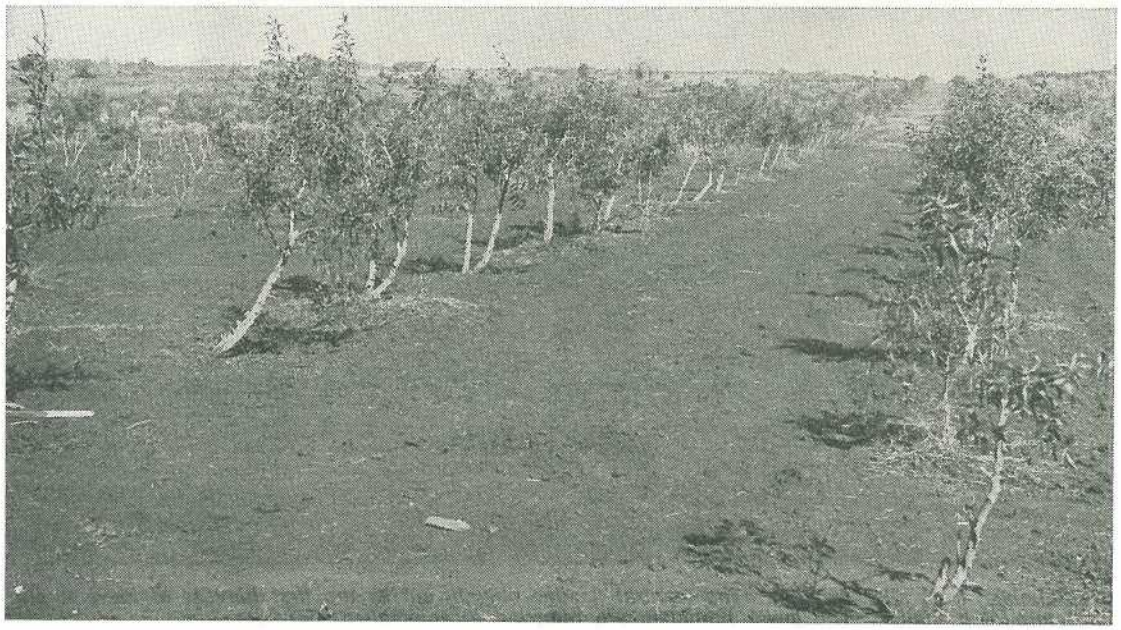
Selection of site

Until recently, little attention was paid to site selection because suitable land had already been cleared and was reasonably well protected by natural stands of timber. Now, with higher prices being paid for grain and beef, the better land is being used for these industries. Growers now find it necessary to look to the more marginal country to find suitable Duboisia-growing land.

Good soil drainage is probably the most important point to consider when selecting land for growing Duboisia. *D. leichhardtii* is susceptible to waterlogged conditions even for short periods. *D. myoporoides* on the other hand is more tolerant of wet conditions than *D. leichhardtii*.

In the early stages of growth Duboisia plants are susceptible to frost. It is therefore advisable to select a warm north-easterly site

A typical plantation planted at a tree spacing of 4.5 x 3 metres. This plantation is 10 months old and the first harvest has been taken off.



where good air drainage is assured. The site should also be protected as much as possible from strong winds.

Land preparation

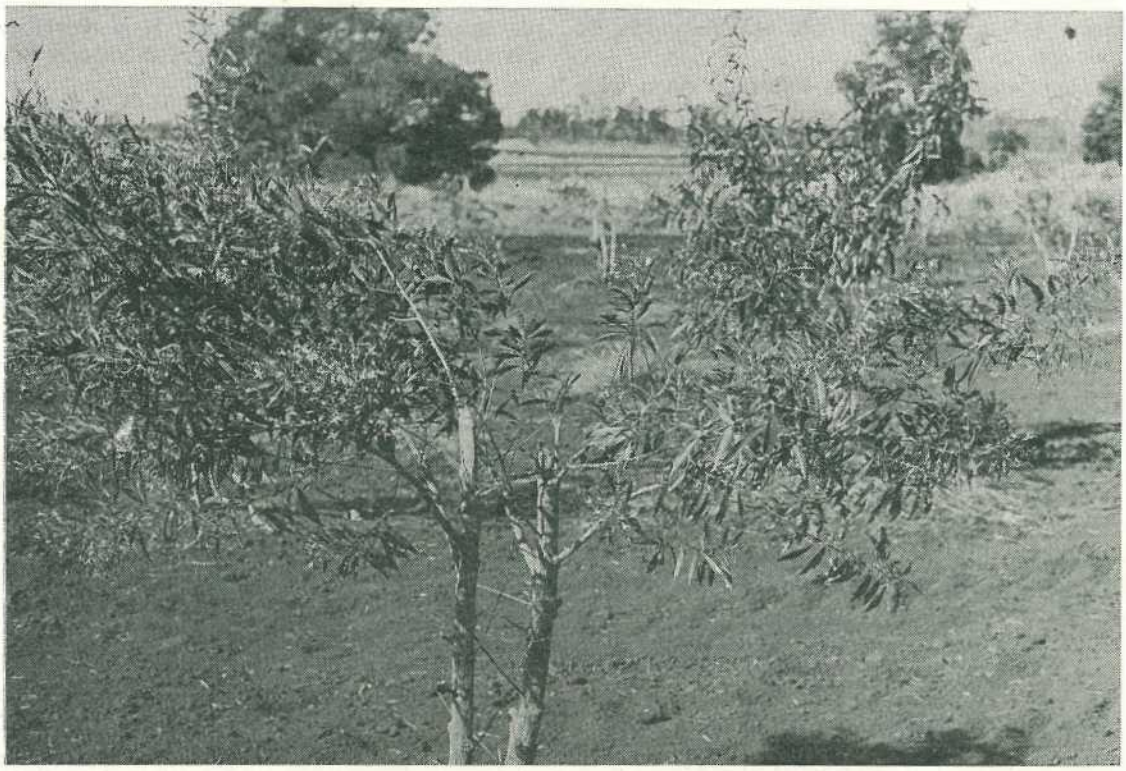
Land preparation is vitally important in establishing of plantations where Duboisia has previously been grown. It is not uncommon, on land that has been newly cleared of its native timber, to get prolific regrowth of Duboisia plants. When this occurs, a useful commercial stand of Duboisia may be obtained by discing the area, but leaving 90 cm (3 ft.) wide undisced strips at intervals of 3·6 to 4·5 m (12 to 15 ft.) across the area.

These strips produce a first crop of leaf in about half the time taken by a stand produced from seedlings raised in a nursery bed and transplanted to field positions.

Where it is necessary to establish a plantation with seedling trees, it is advisable to plough the land to a depth of 20 to 25 cm (8 to 10 in.) about 2 to 3 months before planting. The soil should subsequently be worked to a good seedbed tilth to eradicate as many germinating weed seeds as possible.

When replanting an area where Duboisia has previously been grown, it is best to remove as much of the old crop as possible. The initial ploughing should be 20 to 25 cm (8 to

After harvest, Duboisia regrowth



A Duboisia tree after harvest. The central leader only is cut at the first harvest to leave a strong structure of branches. The lower branches are removed at subsequent harvests.

10 in.) deep and carried out well before planting to allow for the maximum incorporation of organic material from the previous crop. Just before the final cultivation, the area should be deep ripped to 76 cm (2½ ft.) at about 90 cm (3 ft.) intervals. Weed growth should be kept under control during the fallow period to help reduce the nematode population. Another alternative during the fallow period is to plant a thick cover crop of green panic (*Panicum maximum* var. *trichoglume*) which also helps reduce the nematode population.

Soil conservation measures are necessary on slopes steeper than 6%. Small individual banks for each tree row should be constructed before planting so that the seedlings can be placed in the field at their correct depth. It is not advisable to hill soil up to established trees because of the likelihood of collar rot occurring in the area where the stem is covered.

Propagation

There are distinct advantages, commercially, in having a plantation of trees that produce a uniform product. Two factors to consider in any selection programme are high yield and high drug content. Selection and propagation of high yielding trees is a necessary prerequisite.

Until a satisfactory method for producing cuttings has been developed, raising seedlings from selected parent trees is the most widely used and successful method of propagation.

is rapid in good seasons . . .

Regrowth after harvesting. If dry weather follows the harvest, regrowth often takes 3 months to reach this stage.

Best results are obtained where seed is planted into sterilized seedbed soil to reduce the risk of seedling losses from damping-off disease.

Before planting, the seed should be treated with gibberellic acid for 24 hours at a concentration of 250 p.p.m. and at a temperature of approximately 40°C. The temperature can be maintained at a constant level by placing the container with the seed in the gibberellic acid in a larger vessel of water which has already been brought to 40°C.

After treatment, the seed should be thoroughly washed with clean water before being dried to ensure that the seed-coat is absolutely free of the chemical. Excess chemical will cause distortion and elongation of the stems at germination. It is not advisable to plant the seed for at least 6 weeks following treatment as the germination percentage is usually best if left for this period.

The seed is planted dry to avoid excessive elongation of the stem. Failure in the early seedling stage often follows soaking the seed to pregerminate it. Seedlings raised from seed treated with gibberellic acid must be grown in approximately 60% shade for best results. They should not be planted out until the pigmentation of the stem is evident. Field planting can take place in about 12 weeks if the seedlings have had favourable conditions.

Nitrogen deficiency usually appears soon after germination as an after-effect of the gibberellic acid treatment. This is easily rectified by the application of a water-soluble commercial fertilizer preparation containing nitrogen and a range of trace elements. It is best to fertilize the plants little and often, and a suggested rate is 1 teaspoonful of the mixture in 9 litres (2 gal.) of water at weekly intervals.

Field planting

Field planting is usually carried out in the autumn when weather conditions are favourable for transplanting. The area should be worked well in advance so that planting can take place following suitable rains. Plants are usually established in the field when they are about 15 to 20 cm (6 to 8 in.) high.

Trees have been planted as close as 2·4 m between rows and 1·8 m between trees (8 ft. x 6 ft.) but in recent years there has been a trend towards wider spacings. Some plantations have been planted at 3·6 m x 3 m (12 ft. x 10 ft.) and, in the drier situations, some have been spaced as wide as 4·5 m x 3·6 m (15 ft. x 12 ft.).

TABLE OF PLANT DENSITIES

Spacing (metres)	Trees per hectare	Spacing (feet)	Trees per acre
2·4 x 1·8 ..	2 241	8 x 6	907
2·4 x 2·4 ..	1 680	8 x 8	680
3·0 x 1·8 ..	1 794	10 x 6	726
3·0 x 2·4 ..	1 344	10 x 8	544
3·0 x 3·0 ..	1 075	10 x 10	435
3·6 x 1·8 ..	1 495	12 x 6	605
3·6 x 2·4 ..	1 119	12 x 8	453
3·6 x 3·0 ..	897	12 x 10	363
3·6 x 3·6 ..	746	12 x 12	302
4·5 x 1·8 ..	1 196	15 x 6	484
4·5 x 2·4 ..	897	15 x 8	363
4·5 x 3·0 ..	716	15 x 10	290
4·5 x 3·6 ..	598	15 x 12	242
4·5 x 4·5 ..	477	15 x 15	193

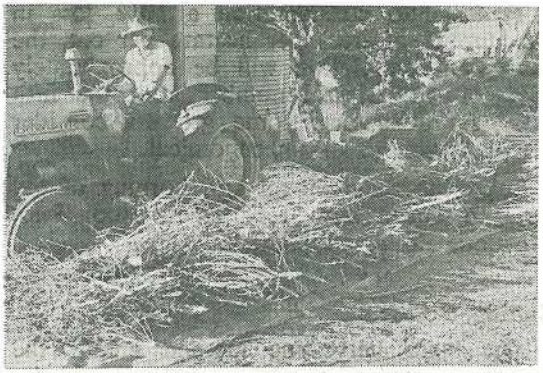
Because seedlings are subject to crown rot, care should be taken to ensure that they are planted at the same depth as they were in the nursery. Insufficient attention to this detail can be the major cause of poor stands. Planting into over-damp soil is also a cause of failure through disease attack.

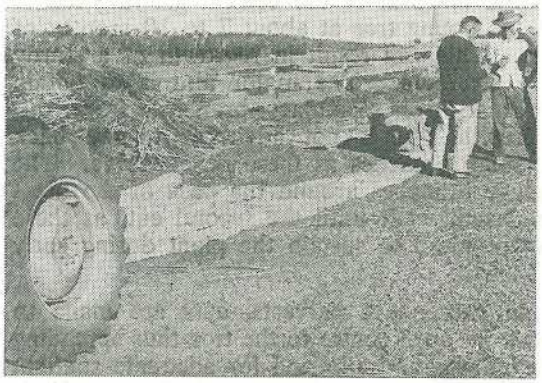
Cultivation and weed control

Weeds cause a serious setback in the growth of young seedlings. Regular inter-row cultivation is necessary to reduce weed competition during the first 12 months. Weeds are usually controlled by discing or chisel ploughing, but penetration of these implements should be kept to a minimum. Hilling up around the base of the young plants should be avoided as this often leads to collar rot disease at ground level.

Some plantations are laid out on the square system and it is then possible to cultivate in both directions thus minimizing the amount of hand work in chipping. Where the plantation is contoured, mechanical cultivation is much more difficult and it is in these situations that chemical weed control is often used.

Trifluralin has been used satisfactorily at 1·4 litres of 40% product per sprayed hectare (1 pint per sprayed ac.) for preplant pre-emergent weed control. It is necessary to





TOP. Threshing Duboisia leaves after harvest.

BOTTOM. Recovery of leaves after threshing. All sticks must be removed to give a salable product.

incorporate this chemical into the soil immediately after application as it breaks down rapidly in sunlight.

Paraquat can be used when weeds reappear. It is applied at 1·4 litres per sprayed hectare (1 pint per sprayed ac.) plus 1·4 litres of a suitable surfactant where weed growth is 10 cm (4.in.) or less. The rate must be doubled if weed growth is in excess of 10 cm (4 in.).

All weed growth must be completely wetted. Spraying the trunks of young trees should be avoided until they have formed the corky brown bark up to about 30 cm (12 in.) from the ground.

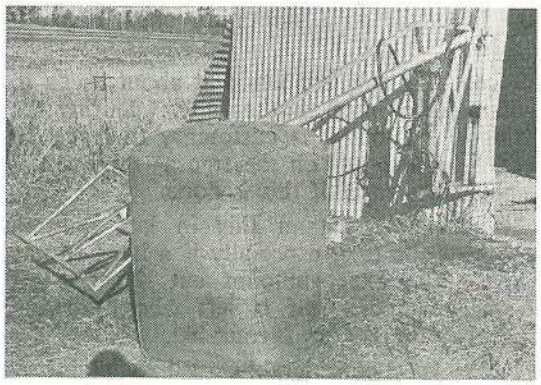
Weed growth between rows can be controlled after the first 12 months either by slashing regularly or by inter-row cultivation. This is determined by the availability of soil moisture.

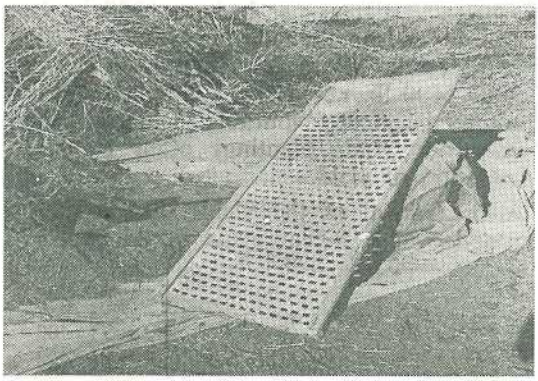
Cover cropping

Most of the soils used for growing Duboisia are lacking in organic matter and every effort to build up the soil is to be recommended.

Oats and black winter rye are usually planted at 56 to 67 kg of seed per hectare (50 to 60 lb. per ac.) in early April after the autumn cut of Duboisia leaf has been completed.

The method of cover cropping most often used is to sow the seed in strips between the rows. These strips are easily turned in later as an ordinary inter-row cultivation. The other method of an overall broadcast of seed involves the use of a costly weedicide spray to clean the cover crop from around the trees in the spring. Before the grain begins to





TOP. A bale filled with Duboisia leaves. The weight is 204 kg.

BOTTOM. A separator screen used to remove the sticks. Screens are often slightly curved to improve their efficiency.

harden, the cover crop is turned in with the spring inter-row cultivation.

Green panic is a most suitable summer cover crop as it is less susceptible to infestation by root knot nematode than other summer crop species. Green panic is usually sown at 6·7 kg per hectare (6 lb. per ac.) and is best slashed often to prevent seeding. If the cover crop appears to be competing with the Duboisia trees for moisture, it is advisable to cultivate the cover crop in immediately. Cultivation should never be deeper than 50 to 76 mm (2 to 3 in.) otherwise severe root damage to the trees will occur.

Harvesting

Harvesting is usually confined to three cuts every 2 years but the number of cuts depends largely on the season. When conditions are favourable, it is fairly usual to harvest the first crop from the new plantation after 7 to 10 months.

Succeeding cuts are made at about seven to eight monthly intervals thereafter. During the cutting operation, it is customary to leave 20 to 30% of the leaf on the tree as regrowth is usually more rapid if this is done.

To cut harder than this in late autumn often kills the tree, especially if a hard winter follows. The exact amount cut depends on the season: more leaf is left when growing conditions are not so favourable.

Yields vary considerably. Where plantings of 740 to 980 trees per hectare (300 to 400 per ac.) are maintained, the yield of dried leaf generally averages about 448 kg per hectare (400 lb. per ac.). This plant density is within the most favourable yield range and heavier or lighter plantings often result in a reduction of yield.

A breakdown of the yields that could be obtained over a 5-year cycle would be—

Cut	kg/ha	lb./ac.
1st:	336 to 560	300 to 500
2nd:	336 to 392	300 to 350
3rd:	280 to 336	250 to 300
4th:	224 to 280	200 to 250
5th:	168 to 224	150 to 200
6th:	112 to 168	100 to 150
7th:	112	100
8th:	112	100

Taking into consideration a 10% loss in the number of trees per hectare per cut, the final plant population will be approximately 60% of the original number after the fifth cut. At this stage, some growers consider the plantation to be uneconomical.

Following the removal and burning of old trees, a cover crop resistant to root knot nematode should be planted.

Cutting methods

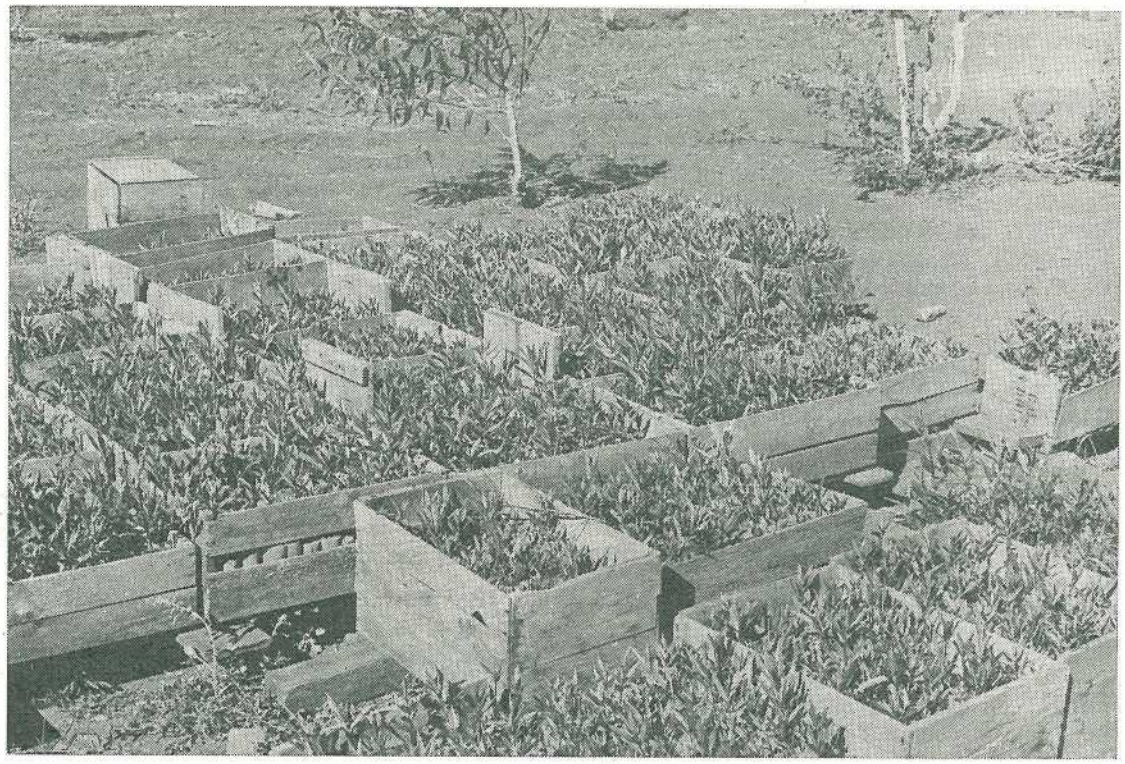
The main harvesting method entails the partial removal of the central growing leader of the young tree at about 7 to 10 months of age. This will result in regrowth of a sturdy tree structure. The major aim is to obtain three to five secondary branches from this regrowth. It is not advisable to cut back to small branches as these never thrive. The twiggy branches around the base of the plant are usually left until the second cut, as these are required to sustain the plant during early regrowth.

In subsequent harvests, cuts are made to leave an open centre to the tree thus spreading the growth and allowing for adequate sunlight to get to each new leader. If a cane knife is used during harvesting, it is not advisable to cut into old wood unless seasonal conditions are favourable. It is customary to leave about 50 mm to 76 mm (2 to 3 in.) of new season's wood above the previous season's growth as this heals faster than the old wood. Considerable splitting occurs with the chopping action of the cane knife and this splitting and subsequent rotting of the affected area often kills the plant.

In recent years, the use of light chain saws has changed the cutting methods slightly. If a neat, sloping cut, which runs off excess moisture is used, then the cuts may be made into older wood without any harmful effect.

Cutting into the older wood helps to clean the trees of the usual unsightly cuts at about the 90 cm (3 ft) level. Prevailing weather conditions should always determine the extent and the type of wood to be cut.

A second harvesting method which shows promise is begun in the same way as the first. Only the central leader is pruned at the first cut and four to six sub-leaders are left. In the



A typical Duboisia nursery. The boxes are filled with perforated plastic tubes. Except in winter, the nursery is not protected.

second cut, only two to three of the most vigorous of the sub-leaders are removed. The remaining two to three are allowed to continue growing until they, in turn, are removed at the third cut.

In this way, good, vigorous branches 1.8 m to 2.4 m (6 to 8 ft) long can be taken approximately every 3 to 4 months. By alternating the cuts in this way, a continuous supply of vigorous leaders can be maintained. The method requires skilled operators if it is to be successful. Only by leaving some vigorously-growing branches at each cut can the growth and cutting rate be maintained at a 3 to 4-month period.

Whichever harvesting method is adopted, splitting of the remaining wood should be avoided as it leads to rotting and access for borers. The cane knife, which is usually used, causes a great deal of damage. Secateurs or light chain saws do not result in splitting and should be used especially during the first harvest as early regrowth depends on a good, sound structure on the remaining portion of the tree.

All cuts are best made at an angle of approximately 45° to the horizontal. Cutting at this angle results in a surface which dries quickly. This makes the cut surface less susceptible to attack by rotting organisms.

While making cuts, support of the cut section reduces unnecessary splitting. The life of the tree would undoubtedly be greater if either secateurs or chain saws were employed at all times but these require more skill and physical effort.

During harvesting, the crop from each tree is bundled together and tied with string. The bundle is hung from the framework of the

tree until afternoon and is then gathered and taken to the shed.

Drying

By the time the bundles have been brought into the shed, about one-third of the water contained in the leaves has already evaporated. Provided the bundles are removed from the field each day, no leaf will have fallen. Loss of alkaloid contained in the leaves could occur if further drying in the hot sun were allowed.

Field drying for a few hours serves two purposes. It reduces the amount of water transported to the shed and helps to prevent the leaf from sweating in the confinement of the shed. It also allows the leaf to dry faster. Fast drying results in a higher alkaloid content because it quickly stops enzyme activity within the leaf. The enzyme slowly breaks down the alkaloids during the drying process, therefore the longer the leaf takes to dry the lower the alkaloid content will be.

The bundles of leaf should be stacked upright in the shed allowing sufficient space between the bundles for ventilation throughout the shed. To facilitate fast drying, sheds should be constructed with open sides. The free airflow in this type of shed prevents the build up of water vapour around the leaf which causes the growth of moulds. These moulds reduce the quality of the leaf.

In large sheds, airways should be left every 1.8 to 2.4 m (6 to 8 ft). Where the leaf remains moist and appears to 'sweat' or when atmospheric humidity remains high for more than 48 hours, restacking of the bundles is advisable to present newly-exposed surfaces to the airways.

Leaf should dry thoroughly within 14 to 30 days where weather conditions remain warm. Faster drying is possible when the leaf is subjected to light breezes.

As Duboisia growing becomes more intensified, growers will be forced to resort to artificial drying methods. The main method used at present is to force hot air through the leaf so that drying is accomplished within 24 hours. This method is costly and growers are advised to seek the advice of skilled technicians before installing costly machinery.

Threshing

Many forms of mechanical threshers have been tried. These work well, but they result in a considerable amount of dust. The dust carries a high percentage of the drug-bearing alkaloid and this creates a health hazard especially if the thresher is used in a confined space without sufficient ventilation.

This problem has been somewhat overcome in recent years by sealing off the whole working section and incorporating a suction air-draught which then conveys the leaf and dust into the bale. By varying the intensity of the suction, the leaf can be easily separated from the sticks which have to be removed before the product is acceptable for market.

Because of the dust problem, the use of machinery is limited and fairly primitive methods are commonly used.

The most common method is to lay the bundles on a concrete floor, tarpaulin or plastic sheeting and run a light tractor backwards and forwards across them until the leaf has been removed from the branches.

Small sticks and branches have to be sieved out as buyers allow only a 2% stick content. All brown or white sticks must be removed. Only sticks containing chlorophyll (green colouring) are allowable in the salable leaf.

Marketing

Growers have very little difficulty in marketing their leaf as all buying countries have good representation and reasonably keen competition exists for the available leaf.

Leaf can be sold in bags or in bales, but baled leaf commands a higher price as the local agents do not have to rehandle the leaf to put it into bales for shipping. Prices paid on the farm in 1973 season were 34c per 0.45 kg for baled leaf and 32c per 0.45 kg for bagged leaf. Grower responsibility ends at the farm as buyers make all overseas shipping arrangements.

At present, there is no limit set by buyers on the percentage of alkaloid. It is expected that in the future a minimum standard will be

set for either the total alkaloid content of the leaf or for a specific alkaloid such as hyoscine. As it is the hyoscine which buyers are chiefly interested in, it will probably be a minimum standard set for this drug.

Health risk

Contact with Duboisia can be harmful to health unless a few simple precautions are taken. It must be remembered that this is a drug plant and in handling the plant during harvesting and threshing operations dust is inevitably created. The dust contains alkaloids which are harmful to those working in it.

Risks to health arise if workers fail to observe personal hygiene and if workers thrash and bale leaf in confined spaces without the protection of overalls, a face mask and goggles.

It is always advisable to handle dried leaf carefully and always in an open shed where there is a draught.

Where a worker feels distressed, he should seek medical advice as soon as possible.

As most of the drug enters the body through the respiratory tract and the skin, it is essential to wear protective clothing. It is also advisable to avoid over-exertion which brings with it excessive sweating.

If this crop is treated with caution, most workers will find little difficulty in carrying out all the operations in the production of Duboisia leaf.

Hen Quota Appeals Tribunal

A Brisbane barrister, Mr. H. P. Ryan, has been appointed Chairman of the Hen Quota Appeals Tribunal, the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.), announced last week.

Mr. Sullivan said that other members of the Tribunal would be Mr. J. D. P. Ross, a retired bank manager nominated by him as Minister, and Dr. J. A. Springhall, Senior Lecturer in Animal Husbandry Queensland University, chosen by him from a panel of names submitted by industry organisations.

The appointments dated from 26 September 1974 and included the period to 31 December 1974. Under the terms of the Hen Quotas Act 1973, a subsequent period of appointment could be prescribed.

'Mr. Ryan was Official Solicitor to the Public Curator before his retirement in 1971,' the Minister stated.

'As a bank manager, Mr. Ross handled all the banking business of the Egg Marketing Board for many years and, in this capacity, gained a valuable insight into marketing and finance matters concerning the egg and poultry industries.'

Mr. Sullivan added that Dr. Springhall, M.B.E., E.D., currently was a representative of the egg-producing section of the industry on the Department of Primary Industries' Poultry Industry Liaison Research Advisory Group. He was the holder of an egg producer's basic hen quota.

Dr. Springhall had been chosen from the panel of names submitted by six Queensland poultry industry organizations.

Tick plots guide dipping schedules

ALERT graziers can use information from the tick observation plots in their region to organize their dipping programmes.

As soon as they learn that tick eggs in the plots are hatching, they can start dipping their cattle.

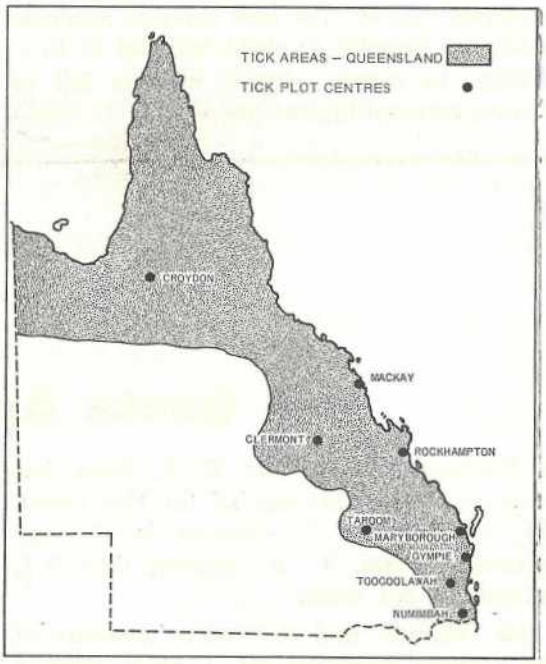
If the larvae can be killed before reaching adulthood, the tick population in the main period of infestation will be reduced.

The graziers must act promptly when they receive the information from the Stock Inspectors supervising the trials which are being conducted at Croydon, Clermont, Mackay, Rockhampton, Taroom, Maryborough, Gympie, Toogoolawah and Numinbah. If they do not start dipping as soon as the eggs hatch, they will not be able to control ticks effectively.

The tick observation plots have been established in these centres by the Veterinary Services Branch of the Department to provide the following important tick control information for cattle owners—

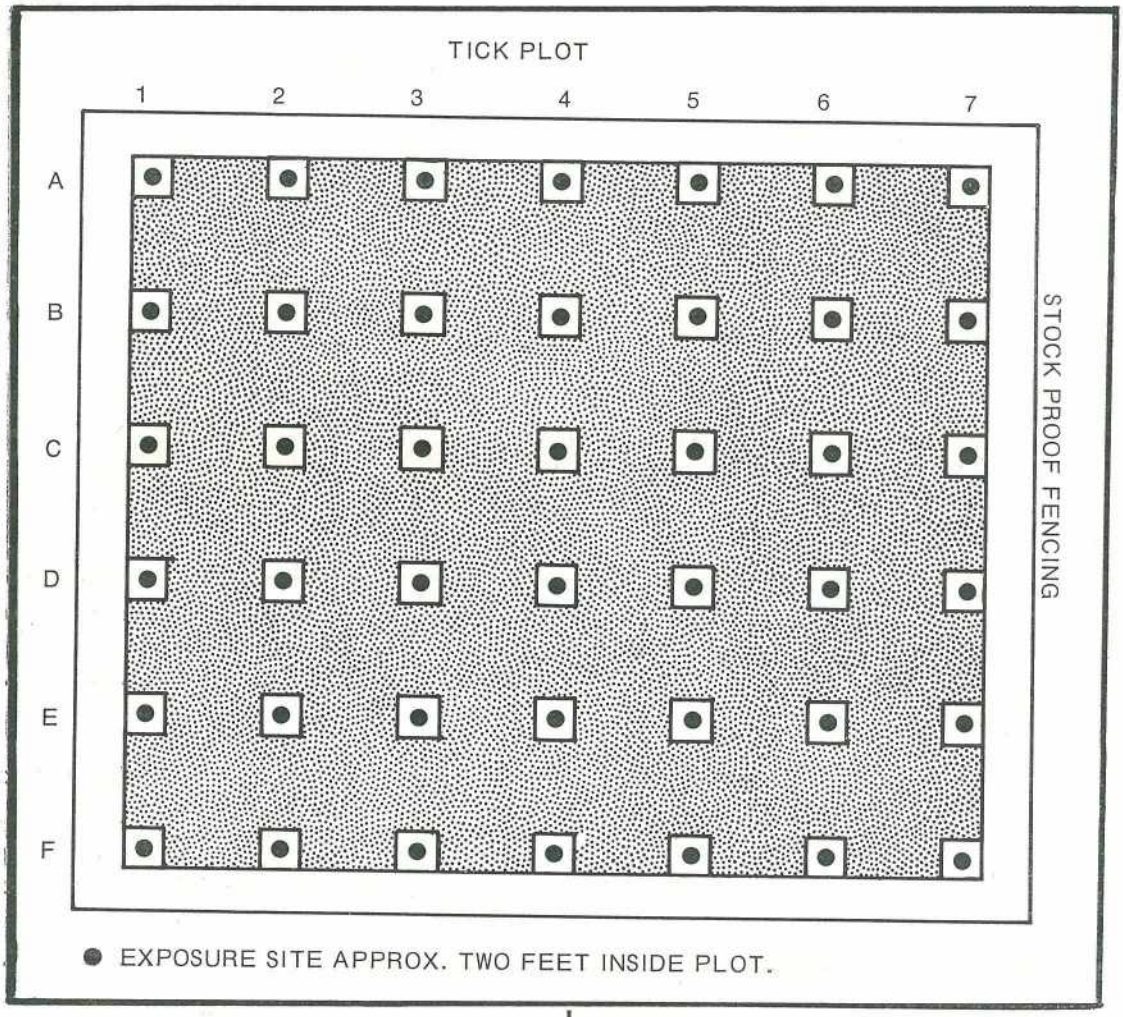
- Start of lay
- End of lay
- Date of hatching
- Life survival time of tick larvae in the pastures.

by J. C. BIGGERS, Inspector of Stock.



The experimental areas cover about 0·3 hectare (¾ acre) and are divided into 42 plots, each about 1·8 metre (6 ft.) by 1·8 metre, with mown laneways (4·5 metres (15 ft.) between them.

Every fortnight, the officer receives 60 to 65 fully engorged female cattle ticks from the Department's Animal Research Institute, Yeerongpilly, Brisbane. He puts 10 ticks into two 2·5 cm (2 in.) long nylon gauze cylinders plugged at each end, and the rest into two open 'arenas' 19·7 cm (7¾ in.) diameter and 10 cm (4 in.) high. A cylinder and an arena are placed on each plot.



Layout of a tick plot.

The small cylinders are attached to a piece of caneite and put on the ground. This method provides ideal conditions for laying and hatching. The ticks are put into the cylinders so that the officer can observe their activities. As soon as the larvae hatch, they are put into the arenas.

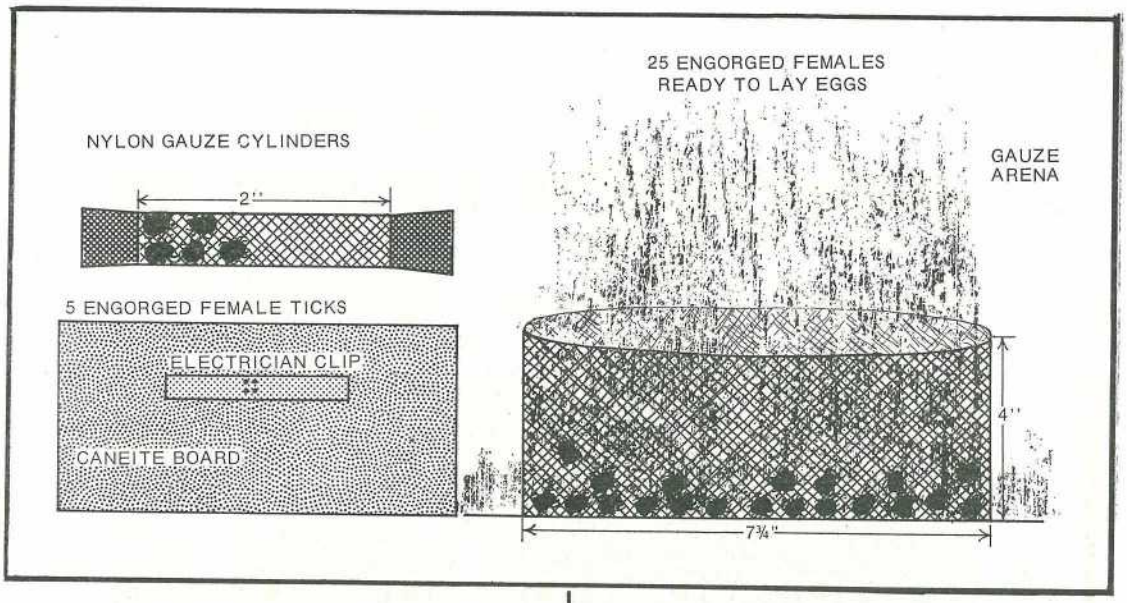
The arenas are worked into the topsoil so that the adult ticks cannot escape, and surround a clump of grass. The purpose of the arenas is to keep the laval ticks in a confined space so that their activities can be watched.

In the trial, the officer notes when the ticks start and finish laying, when the eggs hatch and how long the larvae survive on the grass.

All this information is contained in a quarterly report and illustrated on a graph at the end of 12 months.

The recorded observations provide stockowners with reliable information that can assist them in planning tick control programmes on their properties. Some Toogoolawah graziers are making good use of the local plot to determine when to start their dipping.

The general life-cycle of the tick is well known but more has to be learnt of the effects of climate and situation on egg-laying, hatching and survival of tick larvae in the varying



Engorged female ticks in the cylinder (left) and in the arena (right).

environments in the tick-infested areas of Queensland.

This information is necessary so that the Department can advise stock owners what time of the year will give the best control of ticks by dipping and by pasture spelling.

The Department intends to continue these field trials for some time so that an overall assessment of tick survival and behaviour can be made. Climatic geographic and topographic differences found in a district could produce slight variations in laying and hatching times. However, the information is still valuable to the cattle owner.

Rice Marketing Board

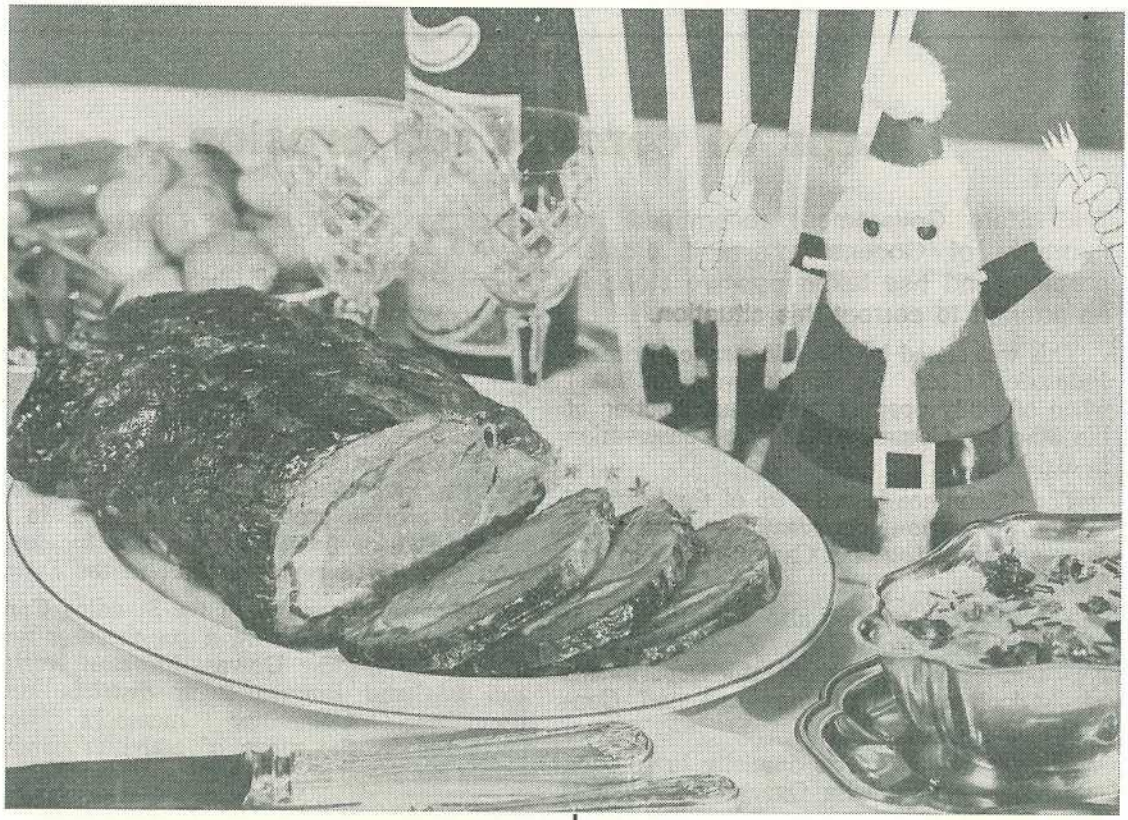
THE State Government has approved amendment of the Rice Marketing Board's constitution to increase grower representation from five to seven members.

Announcing this, the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.) said the Order-in-Council raised the number of representatives in District No. 1 from four to six.

Membership of one grower representative in District No. 2 would not be changed. No petition had been received for a poll on the question of the amendment.

Mr. Sullivan added that the Board was responsible for marketing all rice produced in Queensland. Production was confined mainly to the Burdekin area, with a very limited output in the Ingham district.

Why some cooked meat is tough



This well-cooked Scotch fillet proved an attractive and appetizing Christmas dinner.

MANY important things happen when meat is cooked. Three of them you may not know about.

They are—

1. The red (muscle) fibres toughen.
2. The white fibres soften (These may be invisible; sometimes they are called gristle).

by W. R. RAMSAY, Senior Meat Quality Officer.

3. Moisture and fat go out of the meat. This is detrimental because juiciness is lost.

The higher the internal temperature of meat being cooked the greater 1 and 3 become. High temperature does not affect 2: time does the trick with this.

Therefore—

a Keep internal temperatures of meat as low as possible in cooking. It is possible to use a very hot barbecue plate, cook quickly and keep the internal temperature low but remember—'a stew boiled is a stew spoiled'.

b Minimize the time of frying, barbecuing and keeping after cooking to keep down the bad effects of 1 and 3.

Rare steak is tenderer and juicier than well done steak. Meats 'kept warm' are dried and tougher (just what he deserves if he's late home for dinner).

Steps to combat soil erosion

THE State Government recognized the enormity of Queensland's soil erosion problem and has taken positive steps in an attempt to correct this situation.

This was stated by the Minister for Primary Industries (Hon. V. B. Sullivan, M.L.A.) when officially opening the annual meeting of the Standing Committee on Soil Conservation in Brisbane.

The Committee is made up of the heads of Soil Conservation organizations from each State and the Australian Capital and Northern Territories.

The Brisbane meeting also was attended by representatives from New Zealand, Papua New Guinea and Commonwealth Departments of Agriculture and Environment and Conservation.

The Committee meets annually in rotation around the States, with Queensland the host State for 1974.

Mr. Sullivan said that, in 1969, officers of his Department carried out a soil conservation needs assessment for Queensland.

The information obtained was used to compile the Queensland section of a Standing Committee on Soil Conservation report to the Commonwealth Government, documenting the soil conservation needs for the whole of Australia.

Illustrating the enormity of Queensland's soil erosion problem, he said that the Moreton region was assessed in this report as having 40 000 hectares of land requiring intensive soil conservation treatment.

A comprehensive non-urban land suitability study just completed showed that the area requiring treatment was, in fact, 120 000 hectares—three times as much as was thought to be the situation 5 years ago.

Mr. Sullivan said it was gratifying to note that the Federal Government has recognized the soil erosion problem by proposing, in its recent Budget, financial assistance for long-term conservation programmes in the States.

The two-day meeting of the Standing Committee was preceded by a pre-meeting field trip to the Darling Downs, Moreton Region and Isis and Bingera sugar districts, near Bundaberg. Committee members were impressed by the range of activities coming within the scope of soil conservationists.

They appreciated seeing the development of Areas of Soil Erosion Hazard programmes on the Downs and in the Burnett region.

The substitution of cane assignments being effected as a result of the Isis Land Use Study was of particular interest.

Mr. Sullivan said he believed that the Standing Committee on Soil Conservation would play an increasingly important role in the crucial years ahead by providing soil conservationists with a forum for discussion on how best to meet new challenges.

Work wonders with pastry

MILK and its allied products work wonders in fillings for pastry flans, savoury quiches and turnovers.

The fillings are deliciously rich although the basic ingredients are surprisingly prosaic: an apple puree chilled chiffon filling; a tomato sauce topped with a savoury chicken liver mixture; a garlic sausage pimento sour cream filling; and finally, a salami pepper 'quiche' custard.

The only other secret is the convenience of their crusts. It's bake the pastry, using refrigerated dough products, shortcrust and puff pastry—as simple as that.

The standard 8 oz. measuring cup is used in the following recipes. All spoon measurements are level.

Apple chiffon tart.

Chicken olive flan

12 oz. shortcrust pastry

SAUCE

1¼ cups milk
1 bay leaf
peppercorns and salt
¼ cup of flour
1 onion, quartered
piece of carrot and celery
1 oz. butter
2 tablespoons tomato paste

CHICKEN LIVER FILLING

½ oz. butter
1 onion, finely chopped
2 tablespoons each dry sherry and chopped black olives
8 oz. chicken livers, chopped
1 clove garlic, crushed

GARNISH

1 large firm tomato, sliced
2 bacon rashers, cut into 6 pieces.

Line a fluted 9-in. flan ring with pastry. Prick base well. Bake in a hot oven (400°F) for 10 min. Remove and cool. Pour milk into saucepan add next four ingredients. Bring slowly to the boil. Remove, cool and strain. Melt butter. Blend in flour. Cook 1 min. Gradually add milk stirring constantly until boiling. Stir in tomato paste. Cool. Saute chicken livers, onion and garlic in butter until livers are firm. Mix in olives and sherry thoroughly.

To assemble flan—Pour sauce into partially cooked pastry flan. Spoon over liver mixture. Garnish top with tomato slices and bacon. Bake in a moderately hot oven (375°F) for 25 to 30 minutes. Serves six.

Garlic sausage turnovers

1 lb. puff pastry

1 beaten egg

FILLING

Mix together:

8 oz. garlic sausage, chopped finely

¼ cup sour cream

1 egg, beaten

2 tablespoons chopped parsley

1 tablespoon chopped stuffed olives

1 tablespoon chopped pimento

salt and pepper to taste.

Roll out pastry into two oblong strips approximately 10 in. x 4 in. Divide sausage mixture into two and spread down the centre of each pastry strip. Brush edges with beaten egg. Join edges together. Brush surfaces lightly with egg avoiding edges of pastry. With the point of a sharp knife, feather edges to assist even rising of the pastry. Prick tops and cut on a slant at 2-in. intervals into individual rolls. Place on buttered baking tray. Bake in hot oven (400°F) for 20 minutes or until golden brown. Makes 12 rolls.

★ ★

Mini salami quiches

1 lb. shortcrust pastry

1¼ cups milk

3 eggs

salt and pepper

½ oz. butter

2 onions, sliced

2 tablespoons chopped green pepper

4 oz. salami, sliced in thin strips

Roll out pastry to ¼-in. thickness. Cut 4-in. rounds and line 20, 3¼-in. individual pie pans. Prick bases. Bake in a hot oven (400°F) for 15 min. Remove and cool. Beat together milk and eggs. Add salami. Season with salt and pepper. Melt butter in pan. Saute onions and green pepper for a few moments. Add to egg mixture. Spoon into pastry cases. Bake in moderate oven (350°F) for 20 min. or until custards are set. Remove from pans. Serve immediately. Makes 20 quiches.

★ ★

Apple chiffon tart

BASE

1 packet refrigerated cinnamon rolls.

Open can as directed. Roll cinnamon rolls into one ball. Roll out and line an 8-in. pie plate or flan ring. Bake in a moderately hot oven (375°F) for 15 min. Cool. Spread glace icing from packet over base of pie.

FILLING

1 tablespoon gelatine dissolved in 3 tablespoons hot water

1 cup canned apple puree

1 tablespoon castor sugar

½ cup cream

2 egg whites

Combine first three ingredients. Fold in cream. Whisk egg-whites until stiff then fold in mixture gently. Pour into baked case. Set in refrigerator for several hours or leave overnight.

TOPPING

2 tablespoons apple puree

4 crushed apple strudel biscuits

½ cup cream

Spread apple puree over top of tart, sprinkle over biscuit crumbs. Whip cream until stiff enough to pipe around edges as decoration. Serves six.

S. G. REID, Government Printer, Brisbane

Colletotrichum crown rot

COLLETOTRICHUM crown rot, caused by the fungus *Colletotrichum trifolii*, is a common disease of lucerne in Queensland and is responsible for much of the premature thinning of stands.

SYMPTOMS

The early symptoms are clearly defined spots on the stems varying in length from 5 mm up to 25 mm. These spots are brown to black in colour during the early stages but later become bleached in the centres and dotted with numerous, dark, fruiting bodies of the fungus. While generally close to the crown, these spots may sometimes be found 10 cm or more up the stem. Severely affected shoots may be killed and these withered shoots can often be seen scattered throughout an otherwise vigorous and healthy stand.

The more serious phase of the disease occurs when the fungus enters and kills the crowns, causing obvious thinning of the stand. The characteristic symptom of this advanced stage of the disease is an internal bluish-black discoloration extending from the base of the tillers, through the crown and often into the tap-root for a distance of up to 8 cm. This discoloured tissue is generally dry and shredded, and invariably merges into a brown-coloured area on the margins.

SPREAD

The fungus causing the disease is favoured by warm, moist weather. It is spread readily by countless numbers of minute spores produced in the small fruiting bodies on the surface of the stem spots.

Withered shoots within a stand or affected plants in the trash from a previous stand provide a source of the spores for plants in the vicinity. Rainfall splash then carries the spores onto the stems of neighbouring, healthy plants where infection begins.

CONTROL

Lucerne cultivars vary in their susceptibility to Colletotrichum crown rot and growers should avoid susceptible ones in areas where the disease has previously been severe. Work to develop cultivars resistant to this disease is proceeding.

A programme of crop rotation, incorporating a period of at least 3 years between successive lucerne stands, is necessary. This will reduce the possibility of crop trash providing a source of the fungus in future stands.

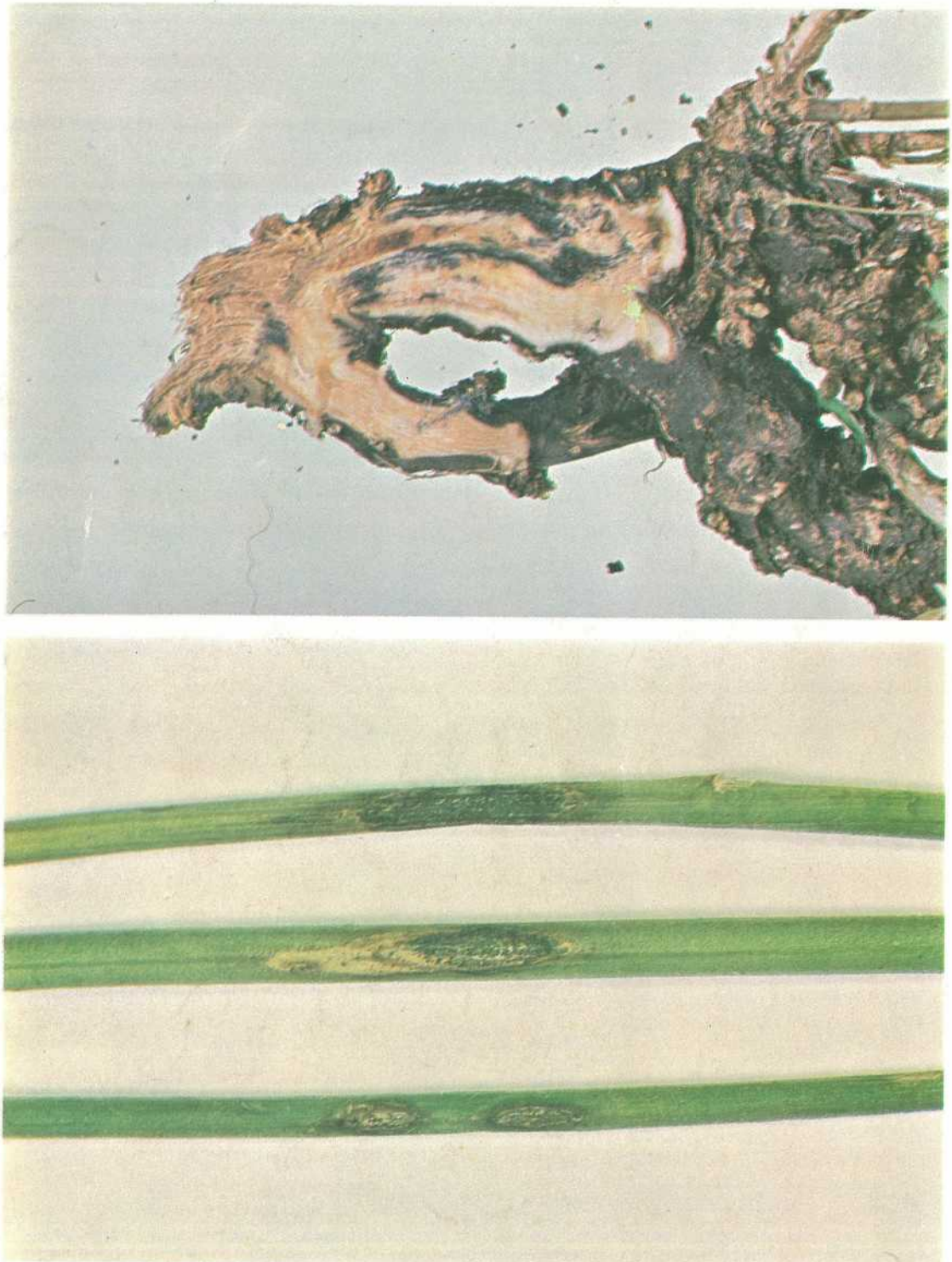
Care should be exercised with sowing rates so that stands can be kept to a reasonable density. This ensures the free movement of air through the stands, and the consequent lowering of humidity will reduce disease build-up.

Frequent light irrigation should also be avoided, as these merely perpetuate conditions favourable for disease development.

— Plant Pathology Branch.

Further information, including recommended cultivars and fungicides, may be obtained from your nearest Plant Pathology Branch office or by writing to the Director, Plant Pathology Branch, Department of Primary Industries, Meiers Road, INDOOROOPILLY, Q. 4068.

Diseases of lucerne - 2



COLLETOTRICHUM CROWN ROT. Upper: discoloured tissues of the crown. Lower: spots on stems.