A Review of Packchong 1 and Juncao Hybrid Napier Grass Varieties

Juncao Napier grass variety (Source: NET)

Pakchong 1 Napier grass (Source: DAFAN)

Napier grass silage

Napier grass pellets

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Introduction

Smallholder livestock farmers in the developing world, especially in Africa are increasingly struggling to make a living from their land because of inadequate fodder/feed supply, low soil fertility and reliance on rain-fed systems. In addition, smallholder livestock farmers along the value chain have limited or no access to financial services. This constrains their ability to acquire productivity-enhancing inputs such as seeds/planting materials, fertilizer, labour-saving and other livestock production enhancing technologies.

Animal feed and nutrition are the essential link in the livestock production chain. Surging demands and struggling supplies result in stressed surroundings in which animal feed operators and farmers need to balance their activities continuously, taking into account animal performance as well as customer, consumer and societal demands. As animal feed contributes up to 80% of the total costs in meat and milk production, and profits in the chain are usually under pressure, improving feed and feeding programs have received and will receive much attention in order to optimize livestock productivity and efficiency.

The information in this article is a review of some of the studies and farmers' experiences on performance of recently introduced Napier (Packchong 1 Super and Giant Juncao) grass varieties. The article also describes some of the methods, apart from making silage, a farmer can use to add value to napier grass fodder.

1. Pakchong 1 Super Napier Grass

Super Napier grass also known as Pakchong or Hybrid Napier is an interspecific hybrid of two species native to Southeast Asia. A team of Thai researchers developed this special high-yielding grass variety in 1960s by culturing the tissue of the pearl buckwheat tree with the African Napier grass. This is why the grass is named after the place of Pakchong in Thailand. The resulting hybrid has a number of advantages over its parent species, including higher yields, better resistance to pests and diseases, and greater tolerance of drought and flooding. The origin of Super Napier is attributed to the efforts of Thai researchers who were looking for ways to increase food production in the region. This hybrid has since become widely used as a fodder crop in many parts of the world including Uganda.

Pakchong Napier grass field at Itungo Pastures, Wakiso district

1.1 Introduction of Super Napier Grass in Uganda

In 2017, the National Livestock Resources Research Institute (NaLIRRI) under the National Agricultural Research Organization (NARO) and The Green Elephant received permission from the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF), Entebbe to import **90 cuttings** of Pakchong 1 Super Napier grass from Thailand. The Green Elephant is a joint Dutch/Uganda business enterprise. Its objective is to develop high quality silage, briquettes, pellets and feed blocks using high biomass forages such as Napier grass**.**

During the period of 2017 to 2019, The Green Elephant with technical support from Dr. Jolly Kabirizi who was working at NaLIRRI, Wakiso district conducted on-farm trials to assess herbage biomass yield and nutritive quality of Super Napier grass variety. The study sites were Wattuba and Semuto in Wakiso and Luwero districts, respectively.


Dr. Chris Littlejohn (a member of The Green Elephant Grass research team) propagating Super Napier grass at Wattuba in Wakiso district


Multiplication fields at Wattuba and Luwero districts

Currently, The Green Elephant has well managed Super Napier grass fields at Bweya, Kajjansi (along Kampala-Entebbe road) and Kayugi village in Masaka district (along Nabugabo Beach road) where they produce and sell baled Super Napier grass silage.

1.2. Characteristics of Pakchong 1 Super Napier Grass Variety

Super Napier grass is a highly productive grass with a long leaf length of 6-8cm, capable of producing 180-200 metric tons/acre/year of green succulent grass which can be harvested 7-8 times a year (depending on soil fertility, climate, management and other factors). The leaves of Super Napier grass are wider, smoother and greener than ordinary Napier grass. Its stems are long, juicy and thick. The fodder is very attractive and tasty for cattle. Super Napier grass is more tolerant to drought and flooding than either of its parent species, making it well suited for cultivation in areas prone to extreme weather conditions.

1.3. Nutritional Benefits of Super Napier Grass Fodder

Super Napier grass fodder contains 17-18% crude protein (depending on soil fertility, climate and management practices). The local napier grass variety is about 8-12 percent protein against a requirement of 16-22 percent crude protein, depending on the stage of production of cattle and other livestock. The dry matter content of ordinary Napier grass is about 22 percent, causing permanent poor body condition and eventually poor reproduction in animals. Super Napier grass fodder is an excellent source of dietary fibre, which helps to reduce cholesterol levels in the body. Additionally, it contains minerals such as calcium, magnesium, phosphorus, potassium, sodium, zinc and other important trace elements. All these minerals are important for maintaining strong bones and teeth. It has a good balance of essential amino acids, making it a great choice for those looking to increase their protein intake. Furthermore, the vitamins found in Super Napier grass include Vitamin A, B1, B2, B3, B6, C, E, K and folate. These vitamins are essential for proper functioning of animal body and can help to boost immunity and improve overall health.

1.4. Super Napier Grass Silage Production

Super Napier grass silage production is a good way of preserving the grass for use during periods of feed scarcity. Fodder trees and shrubs such as Calliandra and Mexican sunflower or leguminous forage legumes such as Lablab should be wilted and mixed with Napier grass to improve the protein content of Napier grass silage. The level of inclusion of leguminous forages should not exceed 30 percent.

Pakchong 1 Super Napier grass silage bales (Ushs 350 per kg) produced by The Green Elephant at Bweya, Kajjansi, Wakiso district (Tel: +256 759752339)

Lactic acid bacteria supplementation increase fermentation of Napier Pakchong 1 silage and decrease the nutrient deterioration of the silage.

Research has showed that addition of molasses mixed with water in a ratio of 1:2 and microbes have a significant effect on texture, colour, aroma, pH and digestibility. The addition of 5% molasses gave the best results on the physical quality of silage, namely soft, dense and not slimy texture, good colour (yellowish green), sour aroma, no fungus and had a pH value of 3.6

Aflatoxins are secondary metabolites and a class of mycotoxins. The term "mycotoxin" is derived from "mykes' ' meaning fungi and "toxin" meaning poison which are produced by moulds. The toxin occurs in feeds and feedstuffs such as silage resulting into severe economic loss to livestock industries in Uganda. Consumption of foods including meat and milk contaminated with aflatoxins is a risk factor for primary liver cancer.

Farmers desire to develop an effective detoxification technology dealing with the feed-borne toxin. A successful detoxification process must be economical and must be capable of eliminating all traces of toxin without leaving harmful residues and also should not impair the nutritional quality of the commodities. Addition of 2-5 percentage **Diatomaceous earth feed additive** during silage production reduces the levels of aflatoxins in silage. Diatomaceous earth is a type of powder made from the sediment of fossilized algae found in bodies of water. Diatomaceous earth feed additive is easy to attach to the harmful substances such as toxins/aflatoxins, viruses, heavy metals, bacteria, and even to the radiation in the body and carries them out of it. This makes it very useful in any detoxification program.

1.5. Effect of Feeding Super Napier Fodder on Milk Production

Super Napier grass is revolutionizing small-scale dairy farming in Uganda and Kenya. Small-scale dairy farmers in Uganda have recorded a significant increase of over 40 percent in milk yield as a result of feeding Super Napier fodder or silage supplemented with forage legumes, minerals, vitamins and a concentrate. Lactating cattle enjoy munching on Super Napier grass, and the plants offer lactating cows abundant nutritive value. As a fodder grass, Super Napier grass gives animals a source of high-protein feed. Generally, the grass and concentrate should be given to dairy animal at a 60:40 ratio. The cows should be provided with plenty of clean water.

According to the *Farmers Review Africa* published in Kenya, Marie Kihanya, a dairy farmer from Kinoo, Central Kenya, has grown Super Napier grass on an eighth portion of her land and attests that her dairy milk production has doubled. She says, "*My daily milk production has increased from 10 to 20 litres/cow/day. Dozens of dairy farmers in Murang'a County have swiftly embraced the hybrid Super Napier grass".* Super Napier has been ranked amongst the fastest growing animal fodder crop worldwide. The Super Napier grass variety has become the most sought after grass by dairy farmers in Uganda due to its milk boosting capabilities.

1.6. Super Napier Grass Leaf Meal (Powder)

Young leaves and stems of Pakchong 1 Super Napier Grass can be cut, chopped, dried under shade, milled into leaf meal (powder) and added to animal feed rations. This type of feed is highly palatable and nutritious, providing high levels of protein, energy, minerals, and vitamin to livestock. For pigs, poultry, rabbits and fish use, 45-day old growth, chopped or shredded.

For larger ruminants like dairy cattle, beef cattle, give 60-70 day-old growth, also chopped or shredded.

1.7. Super Napier Grass Pellets for Livestock Feeding

The growth and utilization of the fodder are greatly influenced by seasons. Forage turns yellow with less nutrients in the dry season. Yet, forage grow vigorous with more nutrients so that livestock cannot eat them up in wet seasons. So, in order to make full use of grass in the wet season to make the effect to come true, the livestock and poultry can be fed in dry season with Super napier grass pellets conserved in process of mowing, drying and crushing.

Compared to grass fodder, grass pellets are convenient for storage and transportation. They contain less dust and debris, are easier to digest for the animals than common grass. The grass pellets are an excellent choice for **feed**. In Taiwan, Napier grass is used for the production of dehydrated grass pellets used as a supplementary stock feed.

Super Napier grass pellets (Source: NET)

Farmers can make Super Napier grass pellets and feed them to cattle, goats, rabbits and poultry or sell them to livestock farmers. By combining with other high quality ingredients, Super Napier grass feed pellets are healthier and with more nutrients and will remain edible for a long time. Turning elephant grass into pellets requires several processes and professional equipment. Below are stages of elephant grass pelletizing process.

1.7.1. Elephant Grass Pelletizing Process

- **Chopping**: Chop wilted Napier grass fodder into pieces of about 5 cm length using a motorized forage chopper.

- **Drying:** The moisture content of freshly harvest elephant grass is high as 70%-75% which needs to be reduced to around 10% to get ready for the pelletizing and ensure a better quality. In this process, a solar dryer can be used to dry chopped elephant grass.

- **Crushing:** Crush into small pieces with the size no longer than the diameter of the die holes of biomass pellet mills. The widely used crushing machine is a hammer mill. It is noted if your target product is feed pellet, in this process, you can add some other nutrients, such as leguminous forages, molasses, processed poultry litter and proteins etc. depending on your requirement. Mix them up with mixer.

BrazAfric Enterprise (Tel: 0779182521) donated by The International Potato Center (CIP)

Donated by Highmark (Uganda) Limited (Tel: 0784080740)

Hammer mills donated to Kyakuwa Farm, Wakiso district

- **Pelletizing:** Pelletizing directly influence the quality of pellets. Given the same raw material conditions, better quality pellets can be produced by high quality pellet mills. The most popular and cost-effective elephant grass pellet making machine is **Flat Die Pellet Mill** or **Ring Die Pellet Mill**. If you don't know which type suit you most,

Flat Die Pellet Mill

- **Drying:** The wet pellets can be dried in a simple solar dryer.

- **Packing:** After drying the pellets are packed according your requirement..

1.7.2. Benefits of Feeding Napier Grass Pellets to Livestock

- **High transform rate:** Feeding the livestock and poultry with the grass feed pellets in dry season results in more meat, egg and milk with less forage.

- **Small volume:** Grass pellet made by grass pellet mill is only around 1/4 of the raw materials in volume in favourable for storage and transportation. In addition, less dust is beneficial to the health of human and animals.

- **Increase palatability and improve the quality of forage**. For instance, sweet clover possesses a flavour of coumarin which livestock more or less don't like. However, it becomes another forage with a strong palatability and high nutritional value.

Intake of Super napier fodder for the young calves may cause indigestion due to the glucose content in stem. To prevent this it can be mixed with dry fodder.

1.8. Super Napier Grass Pellets for Fuel

Super Napier grass as a source of fuel can provide about 18.4Mega Joules per kilogram. Being a high yield plant, Super Napier grass is a good resource of biomass raw materials for fuel production. Super Napier grass is more efficient as a raw material for the fuel production compared to other raw materials.

1.8.1. How to Make Super Napier Pellets for Fuel

For making Napier grass pellets **for fuel**, a farmer requires a complete pellet plant for this procedure. Freshly harvested Napier grass is turned into pellets by undergoing the following procedure:

- **Dry the grass:** Fresh grass contains about 75% moisture. However, for pellet production the moisture content has to be 10%. Hence, the grass has to be dried. It is dried by leaving it under the sun for an hour or two.

- **Chop/crush the grass:** The grass is chopped using a chopping machine or using a farm knife to cut it into smaller pieces manually. If the grass is a lot simply use a forage chopping machine which makes the work easier and faster.

- **Pelleting:** This is entirely done by the pellet mills. Fill the crushed grass into the pellet mill. The pellet mill then mixes the crushed grass and moulds it into small pellets. The better the pellet mill, the better the pellets. So, when purchasing a pellet mill look out for quality. It is advisable to purchase pellet mills from known brands and one that has a proven track record of making quality grass pellets.

- **Cool the pellets**. The pelleting process is exothermic. It involves a lot of friction hence producing a lot of heat. Hence, the produced pellets are hot and soft. The pellets need to be cooled in order to harden; this increases their durability. Running cold water over the pellets cools them. Simply place the pellets in a container and run cold tap water to cool them.

- **Packaging and storage**. After cooling, the farmer can put the pellets in bags then store in a cool and dry place. The pellets are high density hence making storage and transportation easy.

1.8.2. Why Choose Elephant/Napier Grass Pellets?

- **Cheaper Source of Energy:** Elephant grass pellets are cheaper than oil, coal, and other fuels. One kilogram of elephant grass fuel can produce about 18Mega Joules of energy. The production cost of these pellets is also low, which makes it more favorable.

- **Easily Available Raw Material:** Elephant grass can be easily grown in different types of soils because it does not have specific nutrients and water requirements. It can grow up to 13 feet tall, due to which producing their pellet in large amounts is easy.

- **Sustainable Source of Energy:** Elephant grass is a renewable raw material that makes elephant grass pellets a sustainable source of energy. The grass can be harvested 4 to 6 times a year.

- **No Harm to Environment:** Fuels like coal, oil, etc. are a huge source of harmful gases such carbon dioxide. But the same cannot be said about elephant grass pellets which do not produce any dangerous gas and are considered environmentally friendly globally.

- **Easy to Transport:** Elephant grass pellets are very dense and solid, which makes their transportation quite easy. It saves their transportation cost.

1.9. Pakchong Super Napier Compressed Complete Feed Blocks

To maximize profitability from lactating dairy cows fed low quality feeds, a farmer must ensure that these animals receive the required quantity of protein, energy, minerals and vitamins. All these nutrients can be supplied by an innovation called "**Compressed Complete Feed Block**". A Compressed Complete Feed Block is designed to be the only source of feed in compressed form. NutriBlocks can make urban dairy cattle farming a profitable and a viable business.

Kyakuwa Farm located in Wakiso district (Tel: 0777912716) is developing a Compressed Complete Feed Blocks based on Super napier grass leaf meal mixed with locally available high quality agro-industrial by-products such as cotton seed cake, molasses, Diatomaceous earth aflatoxin binder, mineral powder; Mexican sunflower leaf meal and other ingredients to ensure that the Compressed Complete Feed Blocks meets the minimum requirement for growth, production and reproduction of a dairy cow.

1.10. Vermiculture

Shredded Napier grass can be used for mixing with manure or any other substrate in vermiculture. The resulting vermicompost has high nitrogen content. **Vermiculture**, also known as worm composting or vermicomposting, uses worms to convert organic waste into nutrient-rich compost for plants.

1.11. Super Napier Grass Cuttings for Income Generation

It is estimated that over 5,000 hectares of Super Napier grass variety have been established in Uganda for fodder and as a source of income through sale of cuttings and silage. A farmer in Wakiso district reported that during the period of 2018 to June 2023, he sold over 40,000 sacs of Super Napier grass cuttings at Ushs 30,000 (USD 8.2) per sac. One sac contains 280-350 cuttings. He sells the cuttings to dairy farmers in Uganda, Kenya, Tanzania, Rwanda and Zimbabwe. He has established about 10 ha of Super Napier grass.

1.12. Limitations of Pakchong 1 Super Napier Grass Variety

- It is not recommended for hay making owing to its high moisture content.
- Toxic nitrogen accumulates in Pakchong 1 Super Napier grass after application of fertilizer to the soil. The grass should not be fed to cattle for 10-15 days after application of fertilizer (https://vetmedicinebd.com/super-Napier-grass-pakchong/).
- Pakchong 1 Super Napier grass cannot be fed to the animal for 2 days after the first rain of the year or after lightning (https://vetmedicinebd.com/super-Napier-grass-pakchong/). If grass is to be fed at this time, then after cutting the grass from the field, it should first be left in the sun for one day.
- Lactating dairy cows feeding on Super Napier grass **MUST** be supplemented with protein, minerals and energy sources.
- Farmers are transporting planting materials/cuttings from fields that are already affected by **Napier grass stunt disease** to new Napier grass fields. Farmers are advised to check their fields regularly for symptoms of Napier grass stunt disease.
- Recent reports from farmers show that, Super Napier can be affected by maize stem borers when both crops are intercropped or planted near each other. Farmers are advised to plant more than one variety of Napier grass (in different fields).

2. Magic Giant Juncao Grass Technology for Sustainable Livestock Farming

The Giant Juncao grass technology originates from China, and Kenya is now among the 108 countries with the grass species thanks to Liu, who introduced it in 2021. "**Jun**" means fungi or mushroom and "**Cao**" means grass. Giant Juncao grass is a hybrid of the African elephant grass and the bamboo plant (*Pennisetum purpureum* x P. *typhoideum).* The outcome of these crossing is new hybrid varieties that has deep rooted system that supports fast growth, **drought resistance** and high nutrient content. It is a tall growing (3 m +) grass with a strong, fibrous root system.

Giant Juncao grass (Source: NET)

Juncao grass looks like the local napier grass but its leaves are softer and takes 3 months to grow to maturity for harvesting. The Juncao technology was born and developed for poverty alleviation, said Lin. The succulent, fast-growing green plant thrives under heat and drought. It can resist the most common diseases and pests while packing up to 18% digestible protein in its soft, juicy stems. Reports from Kenya show that Juncao will increase milk production by

50%. Further, upon maturity, Juncao grass has the potential to produce 180 metric tonnes of fodder per acre of land.

In the arid and semi-arid landscapes of Kenya, dairy farmers have long grappled with the challenge of feed and fodder scarcity. The quest for sustainable solutions has led to a remarkable transformation at WILDA Farm, located in Njoro, Nakuru. Amidst extreme weather fluctuations and limited precipitation, this pioneering farm is proving that regenerative agriculture practices and innovative Napier grass varieties hold the key to dairy excellence and climate resilience. Juncao grass has revolutionized animal husbandry in Kenya's semi-arid outposts, guaranteeing an uninterrupted supply of nutritious fodder to herders and subsistence farmers.

2.1. Other Benefits from Growing Giant Juncao Napier grass

- **Nurturing Dairy Success: Harnessing the Power of Innovation:** Giant Juncao grass stand as crucial assets for small-scale farmers and pastoralist communities in challenging regions. Dr. Warun emphasizes that Giant Juncao grass, a high-yielding Napier grass variety offers much more than sustenance – it is a catalyst for dairy excellence and sustainability. With their resilience against harsh conditions and abundant forage production, Juncao is a game-changers for farmers.

- **A Nutritional Boost: Elevating Dairy Quality and Yields:** Juncao grass variety, boasts an impressive protein content of 13 to 15 percent and offers a farmer-friendly approach. The ordinary Napier grass, for instance is about 5 to 8 percent against a requirement of 14-22 per cent, depending on the stage of production of cattle and other livestock. The dry matter content of ordinary Napier grass variety is about 22 percent, causing permanent poor body condition and eventually poor reproduction in animals. The grass grows up to 8 meters tall and is harvested three to six times a year. The per-hectare harvest of the grass can feed 400-500 sheep or grow 100 tonnes of fresh fungi.

- **From Resilience to Emission Reduction:** The impact of Juncao grass variety extends beyond nutrition. The variety exhibit resilience in the face of climate challenges, reducing the dependency on concentrates by 50 percent and curbing the financial burden on farmers. Moreover, its biomass production potential of up to 180 tons per acre per annum, offering a substantial feed solution.

  As the world grapples with the effects of global warming, the climate-resilient attributes of Juncao grass variety offers a silver lining. It serves as a buffer against climate change's impacts, providing consistent forage and minimizing soil degradation. "*Another advantage with Juncao grass variety is that during the dry seasons, it sustains the cows such that instead of going to buy hay and incurring more costs since the lower leaves give you the dry matter and the top leaves give you the green matter. If you soak them then the cow would have gotten both matters*," Kaburu, a farmer in Kenya explained.

- **A Beacon of Agricultural Synergy: Regenerative Approach for Resilience:** Juncao napier grass variety is increasingly hailed worldwide as an environmentally friendly solution for its reliability, climate resilience, self-propagation, and resistance to most common pests and diseases. Experimental farms in Kenya have proved that Juncao production systems excel in either pure stands or intercropped with other forages,

grains, or legumes. Though the plant thrives under irrigation, Juncao grows well in low fertile soils under purely rain-fed conditions. This broad adaptability makes Juncao suitable for cultivation across an extensive range of moisture levels – from flooded rice paddies to severely moisture-stressed drylands.

- **Embracing a Sustainable Dairy Future:** The introduction of this high-yield, nutrient-dense, and climate-resilient Napier grass variety signifies a turning point for Kenya's dairy landscape. By adopting this innovative Juncao napier grass variety, dairy farmers become climate change warriors, actively contributing to emission reduction goals. Reduced methane emissions during digestion, coupled with sustainable practices, position dairy farming as a sustainable dairy sector. Planting Juncao grass in drought prone areas of Kenya has been shown to minimise soil erosion and to combat desertification. The Juncao technology is contributing to addressing poverty, employment creation and also addressing environmental concerns in rural areas. It is reported that in Rwanda, for example, the Juncao industry has begun to take shape with more than 3500 farmers and over 50 companies or cooperatives actively participating. In Madagascar, Giant Juncao grass is reported to have supplied sufficient high-quality forage for dairy cows.

- **Juncao Grass: the Mushroom-Producing Grass that Can Change Lives:** Imagine a grass with the ability to alleviate the pressure of food demand for humans and livestock, provide jobs and improve the standard of living, whilst being a solution to environmental problems such as global warming and deforestation. Juncao grass does just that.

  Juncao grass is a crop that can eventually create the substrate for growing mushrooms but can also act as a substitute for wood. Juncao technology has allowed smallholder farmers to grow mushrooms from dried, chopped grasses, without cutting down trees and damaging the environment.

  This environmental-friendly technology can help small-scale farmers and farming communities to develop a low-cost, commercial-scale mushroom cultivation industry that can provide sustainable livelihood options for family farmers and rural entrepreneurs along agri-food value chains. The mushroom can also be used as forage for livestock, resulting in a compound effect and long term improvement in the sources of food for the local community.

Chinese-invented Juncao technology to grow mushrooms in Kenya (Source: NET)

2.2. Experts in Kenya Laud High-Yield and Nutrient-Dense Juncao and Pakchong 1 Super Napier Grass Varieties as Catalyst for Dairy Excellence and Climate Resilient

Feed and fodder continue to be a great challenge for thousands of dairy farmers in Kenya which is 80 percent arid and semi-arid. A farm in Njoro is doing its best to propagate and disseminate high-yielding and nutrient-dense grass Juncao napier variety. In Njoro, Nakuru, where low precipitation and extreme temperature fluctuations challenge small-scale farmers, a transformation is taking place at WILDA Farm. Like many parts of the county, the area is characterised by poor crop performance which this pioneering farm is addressing by embracing dairy farming through regenerative agriculture practices.

Dr Harun Warun, the co-owner of WILDA Farm says by harnessing the power of innovative Juncao grass, WILDA Farm is not only revolutionizing the dairy industry but also contributing significantly to Kenya's climate agenda. Warui, a leading expert in sustainable agriculture says, "*Juncao grass has proven to be as invaluable assets to dairy farmers in marginal areas. Its ability to withstand harsh growing conditions and still provide abundant forage is a game-changer for small-scale farmers and pastoralist communities*".

Warui further highlights the nutritional superiority of Juncao and Pakchong stating that the nutrient content of these napier varieties is impressive as they offer a well-rounded diet for dairy cattle which translates to improved milk quality and higher yields. He notes that the nutritional richness not only boosts milk production but also reduces the need for costly supplementary concentrates and makes dairy farming a more viable and sustainable enterprise for farmers. **Warui advises farmers to invest in Juncao and Pakchong napier grass varieties because, besides the aforementioned benefits, they are also climate resilient and come in at a time when the world is suffering from the effects of global warming**," he says. Warui emphasizes that the integration of Juncao and Pakchong napier grass varieties into regenerative practices showcases the potential for agriculture to mitigate climate change. "*By sequestering carbon and enhancing soil health, WILDA Farm is contributing to a more resilient ecosystem*," he says. "*The napier serves as a buffer against the effects of climate change by providing consistent forage and minimizing soil degradation*," says the farmer.

Warui says *"WILDA Farm's adoption of Juncao and Pakchong napier grass varieties sets a precedent for sustainable dairy farming that resonates beyond Nakuru County and demonstrates that innovative approaches can enhance productivity, promote ecological balance, reduce emissions, and foster knowledge sharing*". Warui says the farm welcomes farmers to learn about its various interventions through collaborations with key stakeholders,.

Conclusion

The journey with Juncao and Pakchong 1 Super napier grass varieties opens a transformative pathway for dairy farmers in Eastern and Central Africa. These varieties promise a future characterized by dairy excellence, sustainable agriculture, reduced emissions, and a resilient dairy sector.

With small pieces of land available for livestock fodder cultivation in Uganda, cultivation of the hybrid varieties is highly desirable. Also considering that some parts of Uganda have two unreliable rainy seasons, with about 7 months of dry season, the Juncao variety with its drought resistance traits and wide adaptability will solve the fodder problem in Uganda.

The applications of China's Juncao and Thailand's Pakchong 1 Super napier technologies are set to empower generations and contribute to the achievements of the sustainable agriculture and the sustainable development goals (SDGs) globally and including in the African continent. With little more than a decade left to achieve the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, the world is not on track to end poverty and hunger by 2030.

References

1. Buker Rogier. 2019. Farmers to get improved grass variety (Unpublished).
2. Kabirizi J.M.L. 2023. Unlocking the potential of feed production technologies, innovations and management practices of smallholder dairy cattle farmers in Uganda. February 2023. ISBN. 9789970675951.
3. Hepirjon Silalahi, Insun Sangadji, Shirley Fredriksz. 2023. Quality of Pakchong Grass Silage (Crimson Pennywort Cv. Thailand) with the addition of different of molasses as ruminant feed. *Jurnal Agrosilvopasture*-TechVol.2 No. 1 (2023)202-209.
4. Wanjiru, S. 2023. Super Hybrid Napier Grass-Pakchong. The OrganicFarmer. ISSUE 210 February 2023. https://theorganicfarmer.org/super-hybrid-Napier-grass-pakchong/
5. https://fainainnovations.com/products/certified-seeds-seedlings/hybrid-napier-grass-varieties
6. https://www.the-star.co.ke/counties/rift-valley/2023-08-13-experts-laud-high-yield-nutrient-dense-napier-as-catalyst-for-dairy-excellence/
7. https://farmersreviewafrica.com/kenya-livestock-farmers-counts-on-thailands-super-napier-grass-pakchong-1-to-improve-production/
8. https://www.kzndard.gov.za/images/Documents/researchandtechnologydevelopment/publications/Research_and_Technology_Bulletins/Giant-Juncao-Grass-Cultivation-in-KZN.pdf
9. https://www.standardmedia.co.ke/farmkenya/livestock/article/2001479072/dairy-farming-gets-a-boost-from-chinese-fodder
10. https://thefarmersjournal.com/napier-grass-pioneering-dairy-excellence-through-high-yield-nutrient-dense-revolution/
11. https://eng.yidaiyilu.gov.cn/p/0NSD2CKK.html